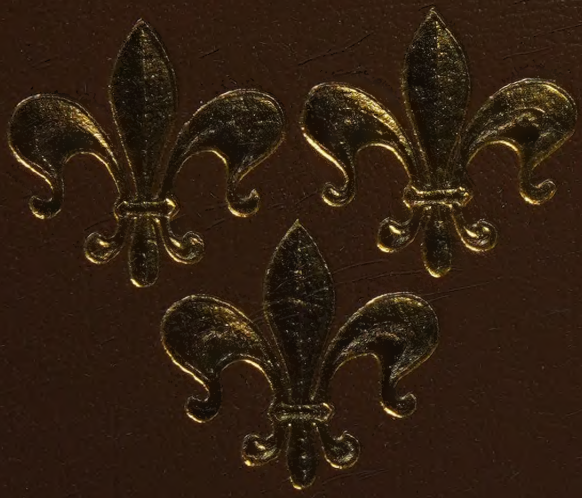

THIS SPECIAL EDITION OF

A TREATISE

ON THE

DISEASES OF THE CHEST

BY R. T. H. LAENNEC, M.D.

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A

TREATISE

ON THE

DISEASES OF THE CHEST,

IN WHICH THEY ARE DESCRIBED
ACCORDING TO THEIR

ANATOMICAL CHARACTERS,

AND THEIR

DIAGNOSIS

ESTABLISHED ON A NEW PRINCIPLE
BY MEANS OF

ACOUSTICK INSTRUMENTS.

With Plates.

TRANSLATED FROM THE FRENCH OF

R. T. H. LAENNEC, M. D.

WITH

A PREFACE AND NOTES

BY JOHN FORBES, M. D.

PHYSICIAN TO THE PENZANCE DISPENSARY, SECRETARY OF THE
ROYAL GEOLOGICAL SOCIETY OF CORNWALL, &c. &c.

London:

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32, FLEET STREET.

1821.

TO

MATTHEW BAILLIE, M. D. F. R. S.

PHYSICIAN TO THE KING,

&c. &c. &c.

THIS WORK,

INTENDED TO IMPROVE

PATHOLOGICAL AND PRACTICAL MEDICINE,

IS INSCRIBED,

AS A TRIBUTE DUE TO HIS ACKNOWLEDGED

SUPERIORITY IN BOTH THESE

BRANCHES OF

MEDICAL SCIENCE,

AND IN TESTIMONY OF THE RESPECT

AND GRATITUDE

OF

THE TRANSLATOR.

TRANSLATOR'S PREFACE.

ONE of my principal motives for undertaking the laborious task of translating the following work, having been the hope of rendering its most valuable contents conveniently accessible to the English reader, I must not now swell either its size or price by a voluminous Preface. I shall, therefore, confine myself to saying a few words on the nature of the original treatise, and on my method of translating it.

M. Laennec has long been known as an ingenious and industrious man, and as a faithful observer. His opportunities for studying the class of diseases treated of in the present work have been, probably, never equalled; and I think it will be allowed by those acquainted with his writings, that their value is proportioned to the extent of his opportunities. He himself informs us that he has been engaged in pathological researches for eighteen years; and when we consider the facilities with which these can be prosecuted in the French capital, we must be prepared to expect a work of great value, as the result of such great advantages. That the present treatise is well entitled to this character I think no one who has perused it will deny; as far, at least,

as regards the pathological part of it. Indeed, the facilities for the prosecution of this department of knowledge in France, are so very superior to those in England, that we ought rather to be surprised that our own country has in any case excelled the former, than that we should be occasionally obliged, as in the present instance, to look to it for information. In explanation of this remark I shall here quote the words of a late writer, who has given us much information respecting the state of medicine and medical institutions on the Continent. "All the hospitals of Paris are under the direction of a general administration; and from the office of this board, where medical men attend during a certain part of the day to examine them, patients are sent to the different hospitals. This plan may be attended with some inconveniences to the patients, but has not a few advantages to the practice of medicine. Through means of this arrangement the physician of any hospital, whose attention is turned more particularly to any disease or class of diseases, by application to the central office may have such diseases sent to his own hospital. Thus a much greater number of cases of the disease, which is the object of his particular inquiry, is brought under his observation in a given time (an object of no small importance) than could otherwise, or might indeed ever, have been. To this plan we perhaps owe, in a great measure, the excellent works of Corvisart and Bayle, and that of Dr. Laennec on the diagnosis of the diseases of the chest. The fatal cases are generally examined after death. Dr. Fouquier told me, that for twelve

years that he had been physician to La Charité, no patient had died without being examined." *

In the original work, the system of arrangement is founded on the new principles of diagnosis introduced by the author; consequently the pathology and diagnosis of the various diseases are blended together, and the former very generally made subservient to the latter. As I have thought this method attended by a great many disadvantages, both in a pathological and practical point of view, I have taken the liberty, in the translation, of re-arranging the work throughout,—separating, almost entirely, the pathology from the diagnosis, and arranging the various diseases under the head of the affected organ. Thus, instead of having, as in the original, the diseases marshalled under four heads according as they are recognised by the exploration of the Voice—the Respiration—the Rattle—and the Circulation,—and the Diagnosis of each disease conjoined and mingled with its description; we have, in the first place, an entire separation of the descriptive from the diagnostic parts; and, secondly, a subdivision of each of these according to the respective localities of the diseases, as affecting the Lungs, Pleura, and Heart. By this means, the work, in place of appearing, as in its original form, a system of Diagnosis, with the pathological part subservient to, and partly concealed by it, is now restored to what I humbly conceive it ought always to have been, viz. two independent treatises,—the one on Pathology, the other on Diagnosis,—mutually adapt-

* Dr. Clark's Medical Notes on Climate, &c pp. 127 and 130.

ed to each other, yet each complete of itself and not necessarily connected with the other. In its present condition, therefore, the work will be found equally available to the practitioner as a system of pathological anatomy, whether he adopts or rejects the author's diagnostics; while, in the original form, these two departments were so interwoven with each other, that, without a previous study of the one, the other could not be well understood. In this respect, then, I consider both the author and the English reader as obliged to me;—inasmuch as, without in the least altering either the facts of the pathology or the diagnosis, I have rendered them both much more accessible, and placed them in a clearer, closer, and more connected point of view.

In respect of the character and value of these two classes of facts, as contained in the treatise now translated, I must here be permited to say a few words. It will be seen from the author's Preface, an abridgement of which follows, that, in his description of the diseases, he has almost exclusively confined himself to the anatomical character of these. His reasons for so doing are stated in the same place, and are principally to be traced to the nature of his new diagnostic measures, which, unlike the usual symptomatological distinctions, are, in most cases, immediately connected with, and necessarily dependent on the physical alterations which constitute the disease.

Hitherto, unquestionably, the attention of nosologists has been too exclusively fixed on mere external symptoms without reference to the internal

conditions of which these were the sign. It is true that there are many diseases with the pathology of which we are unacquainted, and in distinguishing which, we must, therefore, content ourselves with the external symptoms merely, without any constant and direct reference of these to some organic lesion as their source. This is the case at present, I apprehend, with many varieties of fever, and many of the affections called nervous and functional. In some of these instances, I presume, our present inability to trace the morbid derangements to their source, depends merely on our faulty and imperfect investigations hitherto, and will, no doubt, be eventually removed; in others, however, the physical local lesions are in all probability too minute and evanescent ever to become the objects of our actual perception, or, if perceptible, too extensive and complicated to permit us to separate the original and essential derangements from those which are merely contingent. In a philosophical point of view, indeed, the primary changes of structure which constitute the first link in the chain of all diseases must, in all probability, be considered as placed effectually beyond our finding out; and it may, therefore, be objected to the pathological nosologist, that his principle is equally erroneous with that of the mere symptomatologist; inasmuch as the former, like the latter, merely lays hold of one link of the chain, the beginning of which they are both ignorant of; and the only superiority of the former being that his link is nearer the primary one.

In answer to this it may be stated, that this allowed superiority is a most important one, and almost all that is contended for. Although it is the object of the pathologist, unquestionably, to trace morbid phenomena to their *very* sources; still it is true that this is rarely, if ever, attainable; and although, in many diseases, we are willing and ready to imagine certain changes of function or structure, anterior to those that are cognisable by our imperfect senses, in most cases we are obliged to be content, both theoretically and practically, with the knowledge of such alterations as can be recognised by our senses. In the case of a deranged state of the system depending on some external local cause, such as an inflammation or ulcer, we are in most cases satisfied, if we can trace the general derangement to the local lesion, although it is only the obvious physical qualities of this which we can understand with any degree of certainty. In like manner, in the study of internal diseases, we are very well contented if we can ascertain the condition of the local lesion, that is, the change of structure that would be obvious to our senses if the part could be submitted immediately to our inspection.

At all events, we cannot hope, in the present state of our knowledge, to understand any morbid conditions of parts better than those which are immediately the objects of our senses; consequently, our constant aim must be to endeavour to come as near this knowledge as possible in such conditions as are not the objects of these; and the more completely this

is effected, the nearer are we to the attainment of the only sure guide in the treatment of disease. So far, then, I think, it must be admitted, that a knowledge of their anatomical characters forms the most essential part of our knowledge of diseases, and the only sure guide in practice; and consequently, that, in such cases (internal diseases) as this anatomical or essential character is hidden from our view, the perceptible signs which can certainly indicate its presence to us, must be considered as of paramount importance.

It is in this point of view, then, that I consider the pathology of M. Laennec, and the diagnostic measures founded on this, as preeminently valuable. Almost all other diagnostic signs are furnished by symptoms, which, for the most part, have only a remote connexion with the morbid lesion, and are, indeed, frequently present in other and very different diseases. M. Laennec's diagnostics, on the contrary, are the immediate and almost physical result of the individual derangement of parts; and if they shall be proved by the experience of others to be as certain and invariable as he affirms, there can be no question of his having conferred on Medicine, by their discovery, one of the greatest benefits with which it has ever been enriched. Of the uncertainty of the common signs of internal diseases in general, and especially of chronic diseases of the chest, every practitioner must be well aware; and every one who has had much experience in morbid dissections must have often endured the mortification of finding his diagnosis falsified by the actual condition of the parts after death.

It is not intended, by the foregoing remarks, that the study of the general symptoms is useless in the diagnosis of diseases; but merely that, as those are frequently uncertain in their indications, more direct and surer signs are desirable; and, further, that whatever system of diagnosis we adopt, we ought always to keep in view the anatomical character of the disease (where this is known) as the substance whose presence the symptoms denote, and without which they are nothing. In this point of view the descriptions of M. Laennec appear to me to excel those of every other writer on pathological anatomy, inasmuch as he traces the progress of the organic lesions from their commencement to their termination; while almost all other writers on morbid anatomy, however correct or minute, give us merely detached and isolated descriptions of the parts as they are found on dissection. And he not only traces the progressive change of structure in the organ, but connects every successive step of the change with external signs indicative of its existence. In short, (if his new diagnostics are as certain as he affirms) he may be said to have realized the wish of the antient philosopher, and to have placed a window in the breast through which we can see the precise state of things within.

But independently of the value of a correct knowledge of the anatomical character of diseases as leading to a correct diagnosis, this is no less important as tending to the improvement of therapeutics. Without knowing the disease, of course we must be totally incompetent to treat it. Every one admits

this as self-evident; yet how often does it happen, when we fancy that we do truly know a disease, at least so far as to name it correctly, and to discriminate it from others,—that our knowledge is merely the knowledge of a name; or of phenomena not essential to the real disease; or, lastly, the belief of the existence of a condition of parts which is totally different from that which truly does exist! In this case our nosological knowledge is of very little use; or tends merely to satisfy our own minds without benefiting our patient.

In every case where the physical characters of the morbid lesion are known, these ought invariably to form the groundwork of every description of disease; of these all the external symptoms must be considered as merely the signs; and in all our therapeutic measures, these must be kept constantly in view, and the removal of them considered as the abiding object of all our labours. These remarks apply only to such affections as are treated of in the present work, viz. affections which are usually denominated organic, and which may more properly be called structural: those whose anatomical character is as yet unknown, or which consist in mere disorder of function, or in such minute alteration of the animal fibre as to be imperceptible to our senses, must be studied differently; and this is not the place to enter upon the subject.

Although not strictly within the scope of the present remarks, there is one other point in the diagnosis of internal diseases which I would beg leave to impress upon the minds of the younger part

of the profession as of the greatest importance. Of this I have always been convinced; but it is at present more immediately and more forcibly suggested by the consideration of the measures of M. Laennec. What I allude to is—the examination of the external parts of the body in the case of internal disease. How often have I known plain and obvious diseases entirely mistaken and mistreated, for months,—even years,—merely from the practitioner's neglecting this simple but necessary measure! In every case of disease, whether its seat be in the head, trunk or extremities, we ought to examine the suspected part freed from covering, or at least from every species of covering that can impede the necessary examination,—always by the hand, and often by the eye; and wherever the case is at all doubtful, we must endeavour to overcome the repugnance of our patients to the measure, however great this may be, and however natural and proper we may feel it to be, in certain individuals. In this endeavour, if properly conducted, I may venture to say that we shall rarely fail. From the neglect of this precaution I have known peritonitis and enteritis mistaken for simple colic;—disease of the heart for disease of the stomach;—and derangements depending on curvature of the spine treated for years as a mere nervous affection, and, in other cases, as organic disease of the heart, lungs or diaphragm!

——————— vestis adempta est;
Qua posita, nudo patuit cum corpore crimen.

As another branch of the same mode of investigating diseases, I may here notice the necessity of our

strictly examining all discharges from the natural passages of the body, more especially if we have reason to suspect disease in these, or the parts immediately connected with them. In such cases we must never trust to the reports of patients themselves or their attendants, as we are almost always sure of being misled by their prejudice or ignorance, both as to the quality and quantity of the excreted matters. I would further add the internal examination of some of these passages, by the hand or instruments, in every case attended by the slightest uncertainty. How often are diseases of the uterus, rectum, and bladder, mistaken, from the omission of this very simple precaution and how much misunderstood are often the disorders of the alimentary canal, and even of the lungs, for want of attention to the character of their secretions! In short, the more closely we can trace the symptomatic derangements to their source, in every part of the body, the more likely are we to understand the real nature of these, and the less liable are we to be misled by the numerous sympathies, which, in almost every disease, constitute a prominent part among the more obvious phenomena.

As to the individual descriptions of disease contained in the present work—I doubt not that the most learned English reader will find in them many things that are new to him. At the same time he will find several announced as such, and their discovery claimed for France, which have been long familiar to the British pathologist. Indeed, I am sorry to be obliged to remark, that, like most of his countrymen, the

present author is too much disposed to overlook the advances made in science by other nations, and to claim for French literature false and surreptitious honours, which that country's undoubted titles to desert ought to teach her to despise.

In respect of the general merits of *mediate auscultation* as a means of diagnosis, I am disposed to coincide in the high opinion of the author; due allowance being made for the natural partiality of a discoverer. My own experience, of course, has been, comparatively with that of the author, quite insignificant; and has, in every case, but one, wanted the only sure seal of merit—morbid dissection: although, therefore, it would have been both unphilosophical and indecorous to have allowed the few results obtained by me, had they been opposed to those of M. Laennec, to weigh in any respect against the immense experience of that gentleman,—it must be satisfactory, at least, to know, that they have, as far as they go, coincided with his in every respect. I am sorry to say that it is only within the last few months that I have given the new methods of diagnosis a fair and continuous trial; and I am the more sorry, as I am daily more and more convinced of their extreme value. It is in chronic cases, more especially, that the method of M. Laennec will be found of the greatest advantage; and, exclusive of the unimpeached testimony of the author, I have no doubt whatever, from my own experience of its value, that it will be acknowledged to be one of the greatest discoveries in medicine by all those who are of a temper, and in circumstances, that will enable them

to give it a fair trial. That it will ever come into general use, notwithstanding its value, I am extremely doubtful; because its beneficial application requires much time, and gives a good deal of trouble both to the patient and the practitioner; and because its whole hue and character is foreign, and opposed to all our habits and associations. It must be confessed that there is something even ludicrous in the picture of a grave physician formally listening through a long tube applied to the patient's thorax, as if the disease within were a living being that could communicate its condition to the sense without. Besides, there is in this method a sort of bold claim and pretension to certainty and precision of diagnosis, which cannot, at first sight, but be somewhat startling to a mind deeply versed in the knowledge and uncertainties of our art, and to the calm and cautious habits of philosophising to which the English Physician is accustomed. On all these accounts, and others that might be mentioned, I conclude, that the new method will only in a few cases be speedily adopted, and never generally. In all hospitals, however, both civil and military, and in the public services of the army and navy,—in all of which situations the above-mentioned obstacles to its employment scarcely exist,—I should hope that its adoption will be less tardy and partial. It is to them, especially, that it is adapted; it is in them that its merits can be put to the test; and it is to be hoped that if its value is once acknowledged in them, no minor objections of mere inconvenience or formality will be permitted to effect its exclusion from general practice.

Notwithstanding that M. Laennec's invention has been before the public nearly two years, I fear it has received but few, and these unsatisfactory, trials in this country.

Among all my medical friends, Dr. Duncan, Jun. Professor of Materia Medica in Edinburgh, and Dr. James Clark, now of Rome*, are the only ones who appear to have given the practice a fair trial. Dr. Duncan's report of its merits is most satisfactory; and, as his experience has been considerable, and in a field favourable to correct observation, and affording frequent opportunities of proving by morbid dissections the correctness of opinions,—it is to be hoped that the invention will shortly receive from such high authority a new title to the consideration of the public. In a letter which I have just received from Dr. Duncan, he informs me that he has made great use of the stethoscope, and is satisfied that it greatly facilitates the diagnosis of diseases of the chest. As might have been expected, the novelty of the measure excited much scepticism, and some ridicule at first, but the accuracy of the diagnosis obtained by it, soon compensated for and removed these. Speaking of the stethoscope, Dr. Duncan says, "Its use indeed requires *tact*, or rather experience, to enable one to understand the signs it furnishes. The information afforded by it is often obscure and uncertain; so is the touch of the pulse, and all

* It is but justice to state that it was at the suggestion and earnest request of Dr. Clark that I undertook the present work. He was the first to make the practice of M. Laennec known in England, in his excellent and very amusing work on Climate, &c.; and it was the high opinion of its value, as confirmed to me by so judicious and experienced a physician, that induced me to make trial of it in my own practice.

other applications of our senses in the investigation of diseases. I had often heard *pectoriloquism* before I recognised it."—I understand that Dr. Duncan has gained many proselytes to the practice among the students; and I need scarcely observe that the adoption of it by a practitioner of such experience and deserved celebrity is a convincing proof of its value and importance.

In corroboration of Dr. Duncan's statement I may also observe that my first trials of the instrument were very unsatisfactory, from the doubtfulness and uncertainty of the results obtained. This however arose entirely from inexperience, and from not attending properly to the directions given for using the instrument. All the uncertainty and apparent difficulty was soon removed by a little practice; and I speedily became convinced that the results obtained were of that distinct and precise character to justify every expectation of advantage from their being attended to in the diagnosis of disease.

In exploring the Respiration, more particularly, we must be most careful to keep the funnel-shaped extremity of the instrument very exactly applied to the chest, by its whole circular edge, which can only be done by attending to the author's direction of holding it as we do a pen, and keeping the hand quite close to the patient's chest. We must never attempt to alter the perpendicularity of the instrument, so as to bring its extremity to suit the convenience of the ear, but must bring the ear to it; and we must be careful not to press with any considera-

ble degree of force upon the instrument, yet, at the same time, apply the ear quite close to it, and with the meatus directly opposed to its canal. All these precautions are necessary on account of the moderate degree of the respiratory murmur, which, although in general extremely distinct, is often very low, and never, except in certain cases of disease, such as to be called loud, unless comparatively with its own habitual condition. From the same circumstance, the injunction of the author respecting the absence of all other noises in the chamber of the patient, is never to be forgotten; as talking, even in a whisper, in the room, or any noise in the street from wheels, &c. will often effectually mask all perception of the sound we are attending to.

In studying the action of the heart, also, I would suggest one caution respecting the statements of the author as to the extreme distinctness of the sounds. These, doubtless, are very distinct; but the quickness with which they succeed each other requires considerable care, and also experience, to obtain the necessary precision in recognizing them. This caution is, perhaps, the more necessary, as we are apt to forget the natural briefness of the heart's pulsations, while perusing the graduated and formal description of them given by the author. In respect of Pectoriloquism, I would request attention to the varieties of it called *uncertain*, lest the non-perception of it in its very decided character, in cases where the conditions said to be productive of it may be presumed to exist,—should produce scepticism respecting its occurrence at all.

In all cases I must caution the young explorer not to be over hasty in condemning the practice. Let him recollect that the discoverer of the method has declared that it is only in hospital practice,—or in a practice affording similar facilities of reiterated examination both before and after death,—that it can be properly studied. Let him call to mind how many things in his various studies, which seemed impracticable and false at first, further experience taught him to believe both easy and useful. Above all let him never forget, that the object proposed to be obtained, by the new method, is the improvement of the diagnosis of a numerous class of most formidable diseases; an object, which, as it involves every thing that can be most valuable to a medical man, has a right to claim the most zealous and patient attention of every one who has at heart either his own professional success, or the welfare of his patients.

As much and frequent reference is made in the following treatise to the *Percussion of the Chest*, and as this practice is but little known in England, it may be useful to say a few words respecting it in this place. In France, and some other parts of the continent, it is in habitual use; and was reckoned, even before the discoveries of M. Laennec, of very great importance in the diagnosis of diseases. Dr. Clark informs us that "a patient brought into any of the hospitals of Paris with any affection of the chest, is as regularly submitted to this process as the English Physician would ascertain the state of the pulse."

I am informed by Dr. Baillie and Dr. Duncan Jun. that they have both used this method in many cases, and with considerable advantage. The latter states it to be of easy application and of great use. For a detailed account of this method I must refer to the original work of Avenbrugger*, or rather to the translation of it by Corvisart†. At present I shall merely quote a brief notice of it by the latter in his work on the heart, and for this purpose avail myself of the translation of Mr. Hebb. "This method, recommended by *Avenbrugger*, under the name of *percussion*, consists in striking the chest with the ends of the fingers united; in which case, if the lungs are sound, full of air, and if no foreign body, either solid or fluid, occupy the interior of the thoracic cavity, the sound produced by the percussion has been compared (an exaggerated comparison) to that proceeding from an empty barrel when struck. Where, on the contrary, a solid or fluid body fills one of the cavities of the thorax, or both, the parietes give, to the extent so occupied, a sound which has been characterized by the term (*mat*) dull, and which is said to resemble that excited by striking the thigh in the same manner, or with the flat of the hand. The sound produced by percussion in some diseases of the heart, is but little less than in a natural state, and is then the index of a less decidedly morbid state of the viscera within. The knowledge of the degree of sound which denotes the perfect healthy state of all the organs of

* De Percussione thoracis. Vienna, 1763.

† Nouvelle methode pour reconnoitre les maladies internes, &c. Paris, 1808.

the chest can only be acquired by practice; and it is that alone also which enables one, in some sort, to judge of the solidity of the body which prevents the chest from sounding at all; but in forming a judgment, every allowance must be made for the natural thickness of the integuments, and for the very frequent anasarcous state of those parts, which have, in many cases, led to the belief that the chest sounded badly, when it was entirely owing to these circumstances." (Page 327).

Before terminating these prefatory observations, it will be expected that I should say something respecting the share which, as translator, I must claim in the present character of the treatise. I have already stated the changes which I have made in the arrangement of the original articles. The only other alteration of any moment, consists in my having very considerably *abridged* the *cases*, and, also, in a lesser degree, some part of the diagnostic details. The pathological parts are, for the most part, fairly translated, only in many places very considerably *condensed*, by the omission of redundant expressions and repetitions, and by the exclusion of certain paragraphs which had no necessary connexion with the main object of the work. By these means, the work is reduced to one half its original dimensions; and I am inclined to believe that its intrinsic value has by no means suffered in the ratio of its diminution. The truth, probably, is, that medical and other scientific writings, whose value is altogether independent of style, may, unlike the productions in elegant literature, be rather improved than deterio-

rated in the hands of a judicious translator; inasmuch as he will act as a severe reviser of the style, without any of the prejudices and partialities which so easily beset an original writer. With the translator, no favorite expression, or well turned period, or pretty interloping remark, or elaborated and long-concocted yet stupid notion, will find mercy, unless redeemed by some other more useful qualities; yet we must all allow that these and a thousand other things of no greater moment, often plead irresistibly with ourselves during revision, and to the manifest deterioration of our writings. From this cause, then, a work, in being translated, may be greatly condensed, and yet not abridged. The former epithet, I presume, is applicable to the greater part of the present translation; and the latter only to the cases. In respect of these, indeed, I think I have committed an error in this particular; and if I had the work to do over again, I would make some considerable alteration in the manner of detailing them. The truth is—that when I began my translation I was too little impressed with the importance of the diagnostic measures recommended in the work; and my object was rather directed to improve the pathology at the expence of the diagnosis. In consequence of this, I must admit that several of the cases (in the beginning of the work more especially) are too much abridged; and that some valuable diagnostic details are thereby excluded. With the view of making all the amends in my power, I have given several of the more important cases thus abridged, more at length in the appendix; and have added

several others not translated in the body of the work. Indeed I am now disposed to believe that the work would have been improved if I had entirely excluded the Cases from both Parts of it, and had given them in one body, and in considerable detail, at the end; and should the translation (unlike translations) ever reach a second edition, I shall do so still. As it is, however, I still think the present arrangement very superior to the original.

In respect of the mere literary execution of my humble yet laborious task,—I, of course, could have no higher aim than that of giving a faithful delineation of my original. In this, I trust, I have succeeded; and if I shall be considered to have done so, without much violation of the idiom of our language,—I shall obtain the only additional title to credit of which I am desirous, and to which a translator of a merely scientific work can aspire. At all events, even should this claim be refused, I fear the present state of medical *literature* in England furnishes too many examples of bad writing, even in original composition, to render the imputation of a failure very oppressive, where the permanent distorting influence of a foreign idiom can be adduced in excuse.

In the few Notes which I have added to the work, I have noticed some of the principal English writers who have treated on the diseases therein described, and have put down a few very obvious practical inferences and suggestions.—My anxiety to keep the volume within a tolerable size has prevented me from enlarging on this head; and I fear in the few

remarks made, the meagerness of a private and provincial library, and the too limited acquaintance of the writer with the literature of his profession, will be sufficiently conspicuous.

I need not point out the badness of the Plates. The fault is in the original work. My Engraver has copied them most religiously, even in their most obvious defects; and has, indeed, produced as perfect an imitation as is possible. *His translation,* at least, shows the *right* side of the tapestry, bad as even this is.

AUTHOR'S PREFACE.

I BEGAN, three years since, the researches of which I now publish the results. Although these have not reached the degree of perfection which longer experience would have conferred on them, I have thought it adviseable, for many reasons, to communicate them to the public. Among those reasons I may mention—the incorrect accounts of my discoveries that have found their way into the journals of the day; the favourable report of the Academy of Sciences*; and the hope and conviction that the

* Extract from the Report of the Academy of Sciences (drawn up by M. Percy, and signed by him, and M M. Portal and Pelletan, 29th June, 1818,) on a Memoir of M. Laennec respecting the use of Auscultation, more particularly in Phthisis Pulmonalis.

"The Cylinder, applied to the chest of a healthy person who sings or speaks, produces a sort of vibration, which is more distinct in some places than others. But when there exists an ulcer in the lungs, the patient's voice then, instead of being heard in the usual manner by the exposed ear, reaches the other entirely through the tube of the instrument. We have ourselves verified this fact on several consumptive patients; it appeared to us striking, and well-fitted for furnishing a certain and easy sign of certain morbid conditions of the lung, which, in the present state of medicine, can only be suspected to exist. * * * * * * * * * *

We have also examined, by means of the cylinder, the respiration in different parts of the chest of a healthy person, and found it very distinctly audible in every point of this cavity which corresponded with the lungs. We have also found that the motions of the heart were equally perceptible; and it has, consequently, appeared to us, that the assertions of the author, of the possibility of obtaining, through these two kinds of auscultation, certain signs of the several diseases of the heart and lungs, were, at least, extremely probable."

mode of exploration detailed in this work will be confirmed and extended by other observers.

It will be found that of the facts narrated in my treatise, I have given some as certain, others as doubtful, and a few merely as problematical. Of the first class, if future experience should invalidate any, I may venture to believe that the number will be few; and I am even convinced that the greater part of those which I have stated as doubtful, will be found by further observation to be constant and certain.

In respect of the pathological details, which constitute so large a portion of the work, I think it necessary to make a few observations. The great attention that has been paid to morbid anatomy, since the commencement of the present century, throughout Europe, and more especially in Paris, has been productive of many improvements and discoveries which are but imperfectly known; and, indeed, many of which have not at all been communicated to the public, at least by their discoverers. On this account, the present state of our written knowledge is obviously behind our actual knowledge; and if, in the present work, I had contented myself with merely describing the signs of the organic lesions, without describing the lesions themselves, I should have often run the risk of being not understood at all, or (what is worse) of being misunderstood. I have, therefore, felt that the only means left of escaping this danger, was to give an anatomical description of all the diseases of which I have noticed the symptoms. In fulfilling this task I have

endeavoured to render my descriptions concise, yet, at the same time, sufficiently exact and complete to characterise the objects.

Another motive has contributed to strengthen this resolution:—viz. the conviction of the practical utility of my mode of diagnosis, and the belief that the surest way of procuring its more general adoption was to associate the exposition of its principles with a description of the diseases which it indicates, more exact than any that yet exists.

Many reasons have induced me to prefer the anatomical to the mere symptomatical description of diseases. The former method has the advantage of brevity, perspicuity and certainty. It is, for example, much easier to describe tubercles and detail the signs of these, than to define the disease by the external symptoms only, and to arrange its varieties according to their *causes*. Emphysema of the lungs consists in an alteration of parts which can be described in a few words, and of which the signs can be easily recognised; while in studying Asthma, according to the method of Sauvages, we shall require to write a volume on generalities before we can arrive at any thing positive.

It will, perhaps, be objected that the anatomical method has the disadvantage of founding its species on distinctions, the chief characters of which can only be obtained after death: but this objection scarcely merits refutation. We might as well say that it is useless for Surgeons to make any distinction between dislocation of the femur, and fracture of its

neck; or that it is useless to separate Bronchitis from Peripneumony.

The morbid alteration in the affected organ is, unquestionably, the least variable and most positive of the phenomena of local disease; it is on the nature and extent of this alteration that the danger and curability of diseases always depend; and it is this, consequently, that ought to be considered as characterizing them. On the contrary, the derangement of functions which accompanies these alterations is extremely variable; it is often the same under circumstances entirely different; consequently, it can rarely serve to discriminate different diseases.

Besides, it is a mistake to consider the recognition of nosological species, founded on the data of morbid anatomy, as impracticable before death: on the contrary, they are often more readily recognised during life, and certainly present to the mind something much clearer and more positive, than any nosological distinction founded on the symptoms merely. Peritonitis, for example, is assuredly a disease easily distinguished during life; and out of twenty medical men acquainted with morbid anatomy called to see a case of it, not one will make a mistake concerning its nature or name. But will this be the case with those who are accustomed to see in diseases nothing but symptoms? Of the twenty shall we not find one considering the affection as *ileus*, another as *hepatic colic*, a third as *puerperal fever*, and so on? The same thing may be said of peripneumony, nephritis, hepatitis, &c.; and I hope that the work now submitted to the public will enable us to say

the same thing of most of the diseases of the lungs, pleura and heart.

Morbid anatomy must, then, I think, be considered as the surest guide of the physician, as well to the diagnosis as to the cure of diseases. But it must not be forgotten that it has also its obscure points. It is, no doubt, an easy matter to distinguish striking changes of structure; but there are many slighter alterations, among which it is difficult to ascertain what is healthy and what diseased; what cause and what effect; and, lastly, whether the appearances are truly the effect of disease, or merely an accident of assimilation, or circulation, that has taken place in articulo mortis, or even after death. In these cases we must content ourselves with what is clear and distinct; never forgetting in practice the principle of Hoffman—*Nunquam aliquid magni facias ex mera conjectura aut hypothesi;* and sedulously guarding against the error of believing that the mere knowledge of the seat and nature of the disease can justify our neglecting its individual character, as influenced by external circumstances or personal idiosyncracy.

From the foregoing observations it will be seen that this work is not, like that of Avenbrugger, a simple exposition of new means of diagnosis. Neither can it be considered as a monography of the diseases of the chest,—since I have taken little notice of the ordinary and more general symptoms of the diseases, and have not at all touched upon their treatment.

In the construction of my treatise I have quoted but few authors. The chief object of my researches was, in a great measure, new; and for the facts already known respecting the diseases of the lungs and heart, I have thought it unnecessary to go beyond the works of M. Corvisart and Bayle.* If I have occasionally differed from these distinguished authors, I trust no one will misinterpret my motives. No one can be more sensible of their merits both as men and Physicians, than myself. At the very time I question their opinions, I most willingly confess my great obligations to them: It is much easier to improve a field already cultivated, than to reclaim a wild and barren soil. In respect of the works of M. Corvisart, more particularly, it is to be regretted that those of them published by others, are far from giving a just idea of the author's merits. The uncertainty of the signs of diseases, and the vagueness of description in these, appear peculiarly striking to those who, like myself, were his pupils, and habitual witnesses of the boldness and precision of his diagnostics. This defect, no doubt, partly depends on the incommunicable tact of the physician, which forms so great a part of the art, and which M. Corvisart possessed in the highest degree.

I have hopes that the advantages of my method of diagnosis may be extended, in some degree, to ve-

* Essai sur les maladies et les lesions organiques dn cœur, &c. par J. N. Corvisart. Translated by Hebb. London, Underwood, 1813.

Nouvelle methode pour reconnoitre les maladies internes de la poitrine par la percussion de cette cavité, par Avenbrugger, ouvrage traduit du latin et commenté, par J. N, Corvisart. Paris, 1808.

Recherches sur la Phthisie pulmonaire, par G. L. Bayle. Paris, 1810. Translated by Barrow. 1815.

terinary medicine. Many reasons, however, exist, why this art must derive inferior benefit from it. Among these I may mention the absence of the voice;—the comparative inaccessibility of the region of the heart; and lastly the great indistinctness of respiration in the horse, and probably all herbivorous animals. In cases of disease, however, the respiration will be more audible in the sound portions of the lungs; as I found in a case of peripneumony in a cow, which I recognised during the animal's life, as easily as in the human subject. In the dog, and cat, and probably in all carnivorous animals, the sound of respiration is as distinct as in man. Notwithstanding these difficulties, I have no doubt that further experience will prove the utility of mediate auscultation in the disease of animals, expecially if combined with percussion of the chest.*

* The author further suggests the probable utility of the stethoscope in the instruction of the deaf and dumb, by applying one end of it to the trachea of the speaker and the other to the ear of the pupil:—but surely this must be fanciful,—or at least of inferior value to other means.—Trans.

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ANATOMICAL ACCOUNT

OF

DISEASES

OF THE CHEST.

Book First.

OF THE LUNGS.

CHAP. I.

OF PHTHISIS PULMONALIS, OR TUBERCULAR DISEASE OF THE LUNGS.

SECTION FIRST.

Of the essential, or anatomical, character of Tubercles of the Lungs.

THE existence, in the lungs, of those peculiar productions to which the name of *Tubercles* has been restricted by modern anatomists, is the cause, and constitutes the true anatomical character, of Consumption.

These bodies, when first observable in the substance of the lungs, have the appearance of small semi-transparent grains, greyish or colourless, and varying from the size of a millet seed to that of a hemp seed:

in this, their first state, they may be called *Miliary Tubercles.* These gradually increase in size, and become yellowish and opaque, at first in the centre and successively throughout their whole substance. In their progressive and mutual increase, several unite together so as to form larger masses of the same kind, which, like the individual ones, are of a pale yellow, opaque, and of the consistence of very firm cheese: in this stage they may be named *crude* or *immature Tubercles.*

It is in this stage of their progress that the substance of the lungs, which had been hitherto healthy, begins to grow hard, greyish, and semi-transparent around the tubercles, by means of a fresh production and seeming infiltration of tuberculous matter, in its first or transparent stage, into the pulmonary tissue. It also sometimes happens that considerable portions of the pulmonary tissue put on this character without any previous development of individual tubercles. Parts so affected are dense, humid, quite impermeable to air, and exhibit, when cut into, a smooth and polished surface. Gradually there are developed in these comparatively solid and pellucid masses, an infinity of very minute yellow opaque points, which, increasing in size and number, at length convert the whole diseased space into a tuberculous mass of the kind named *crude* or *immature.*

In whatever mode the tubercles have first shown themselves, they at length, after a very uncertain period, become, first, softened, and finally liquefied. This change of consistence commences in the centre, and progressively approaches the circumference.

In this stage the tuberculous matter is of two different kinds in appearance:—the one resembling thick pus, but without smell, and yellower than the immature tubercle; the other, a mixed fluid, one portion of it being very liquid, more or less transparent and colourless (unless tinged with blood), and the other portion opaque, of a caseous consistence, soft and friable. In this last condition, which is chiefly observable in strumous subjects, the fluid perfectly resembles whey having small portions of curd floating in it.

When the softening of the tuberculous mass is completed, this finds its way into some of the neighbouring bronchial tubes; and as the opening is smaller than the diseased cavity, both it and the latter remain, of necessity, fistulous, even after the complete evacuation of the tuberculous matter. It is extremely rare to find only one such excavation in a tuberculous lung. Most commonly the cavity is surrounded by tubercles in different stages of their progress, which, as they successively soften, discharge their contents into it, and thus gradually form those irregular and continuous excavations so frequently observable, and which sometimes extend from one extremity of the lungs to the other.

Bands, composed of the natural tissue of the organ, condensed, as it were, and charged with the tuberculous degeneration, frequently cross these cavities, in a manner something resembling the *columnæ carneæ* of the ventricles: these are of less dimensions in their middle than at their extremities. These cross bands have often been mistaken for vessels; and M. Bayle

himself seems to have fallen occasionally into this error, since, he says, that vessels *frequently* traverse such cavities; whereas this is, in my opinion, a very rare circumstance. Nay more, I have never even found a vessel of any consequence included within the substance of these bands. Neither is there any example of this in M. Bayle's work; and I only remember to have heard him mention one case where this took place, viz. in a fatal Hæmoptysis, where the ruptured vessel was found crossing a very large cavity. In the few cases where I have found blood vessels in such bands, they constituted only a small portion of their mass, and were, for the most part, obliterated. Generally, indeed, they can only be traced for a small space into these columns, being soon undistinguishable from the pulmonary tissue injected with the tuberculous substance. It would appear that the tubercles, during their increase, press on one side and separate the blood vessels, as we find these sometimes of considerable size, lining the internal surface of the cavities, and forming a part of them. These vessels are generally flattened, but rarely obliterated: their smaller ramifications, however, which stretch towards the tuberculous excavations, or towards unevacuated tubercles, are evidently so, as is proved by our abortive attempts to inject them. Baillie and Starck had already made the same observation. The ramifications of the bronchia, on the contrary, seem rather enveloped than pressed aside by the tuberculous matter; and it would appear that the pressure soon obliterates their canal, as they are hardly ever to be detected in the morbid substance. That they must,

nevertheless, have originally traversed the spaces now occupied by the tubercles, seems proved by the fact, that in every excavation, even the smallest, we find one or more bronchial tubes opening into it. These tubes scarcely ever open sideways, but are cut directly across, on a line with the internal surface of the excavation; and their direction is such as shows them to have originally crossed this space.

In proportion as an excavation discharges its contents, its walls become covered with a species of morbid or false membrane, thin, smooth, white, nearly quite opaque, of a very soft consistence, and almost friable, so that it can readily be scraped off by the scalpel. This membrane is generally quite perfect, covering the whole internal surface of the cavity. Sometimes, in place of that just described, we find a membranaceous exudation, thinner, more transparent, less friable, more intimately connected with the walls of the cavity, and, for the most part, lining these only in part. When completely investing the cavity, it presents, in different parts of its surface, points here and there of greater prominence, as if the exudation had begun in these different spots at the same time. Frequently we find this second membrane beneath the first, which last is then quite loose and lacerated in several places. Occasionally, also, both these membranes are entirely wanting, and the walls of the cavity are directly formed by the natural tissue of the lungs, which, in this case, is commonly condensed, red, and charged with tuberculous degeneration in different stages of its development.

From these facts it appears to me that the second

species of false membrane just mentioned is only the first stage of the first species; and that when this is fully formed it is apt to be detached and discharged in a greater or less degree,—forming one portion of the sputa expectorated by the consumptive.

Bayle thinks that this false membrane secretes the pus expectorated in this disease;—an opinion which is founded on the analogy existing between it and that which forms on the surface of blisters and ulcers. It seems certain, however, to me at least, that the greater part of the matter expectorated is the product of the bronchial secretion, augmented as this is by the irritated condition of the lungs. I do not assert that pus is not formed in these tuberculous excavations at all, but I certainly have observed that when these are lined by the soft membrane described above, they are often entirely empty, and that, when they do contain any puriform matter, this bears by no means so great a resemblance to the sputa, as that does which is contained in the bronchia.

If the disease remains long stationary, there are at length developed, in different points under this false membrane, patches of a greyish white colour, semi-transparent, of a texture like that of cartilage, but somewhat softer, and adhering closely to the pulmonary tissue. These patches coalesce as they grow in size, so as eventually to form a complete lining to the ulcerous excavation, and this lining seems to form one continuous surface with the internal coat of the bronchial tubes which open into it.

When this cartilaginous membrane is completely formed, it is commonly white or of a pearl-grey; or

it has a slight reddish or violet tint, which latter colour is derived from the colour of the subjacent tissue being seen through it. Sometimes, however, even when the membrane is of considerable thickness, its internal surface is of a rose or red colour, which does not yield to washing, and which is therefore probably occasioned by the vascularity of the part, although, in such cases, we are unable to detect any distinct vessel.

In some very rare instances we find tubercles entirely, or almost entirely, softened, in a portion of lung in other respects quite healthy and crepitous; and, in such cases, (two or three of which only I have met with in eighteen years,) the walls of the cavity are smooth, and seem to be formed merely by the pulmonary tissue somewhat condensed, there being no accidental membranous production whatever.

Sometimes, but very rarely, the semi-cartilaginous membrane is perceptible before the softening of the tubercles, and, indeed, seems to be of the same date as themselves. This is the *encysted tubercle* of Bayle. The texture of these cysts is entirely cartilaginous, only a little less solid than cartilage, and they belong, therefore, to the class of *imperfect cartilages*, of which I have given an account in another place.* They adhere firmly, by their exterior surface, to the parts which surround them, so as only to be separable by the knife, or by forcible detraction. The tuberculous matter contained in these adheres strongly to their sides, which, when it is removed, are seen to be smooth and polished, though more or less uneven or

* Dict. des Scienc. Med.

rugged. These encysted tubercles are more frequent in the bronchial glands than in the substance of the lungs.

The above is the ordinary manner in which tubercles are developed; but there are two other modes, which, although probably mere varieties of the former, are yet deserving notice. The one is where, in a lung containing tubercles in different stages, we find small portions of the pulmonary tissue seemingly infiltrated by a gelatinous-looking matter of a consistence intermediate between liquid and solid, transparent, and of a light greyish or sanguineous hue. In these diseased portions the cellular structure of the lung is quite destroyed; but we can perceive in them a multitude of very small points of a yellowish white colour and opaque, and which are evidently portions of the tuberculous matter which has reached the second stage of its progress, without there being any surrounding portion of the greyish substance which denotes the first stage.

The second mode of anomalous development of tubercles appears likewise to take place without any previous formation of grey matter: at least, if there be such, the transition from it to the second stage is so rapid that I have never been able to detect its presence. In this variety we find here and there in the lung tuberculous masses of a yellowish white colour, much paler, less clear, and differing less from the substance of the lung than the ordinary *immature* tubercle. These masses are irregular, angular, and have scarcely ever the rounded form of ordinary tubercles. They seem, like the variety described in

the preceding paragraph, and like the diffused grey matter noticed before to be an infiltration of tuberculous matter into the pulmonary tissue, while the proper, or rounded, tubercles are foreign bodies which separate or press it aside, rather than penetrate it. These masses may, therefore, properly enough be named *tubercular infiltration of the lungs.* They occupy sometimes a considerable portion of one lobe. When they reach the surface they occasion no prominence on the part, nor in any degree alter its form. As they increase they assume the yellow colour of other tubercles, and terminate by softening in the same manner.

These three varieties of tuberculous degeneration are often found in the same lung. Sometimes I have found the last variety alone, in lungs affected with peripneumony, and this even in the *hepatised* portions. In these cases, the small number and extent of the diseased masses, and their deep pale colour, showed their formation to be recent. We must not, however, conclude that the tuberculous degenerations were here the effect of the inflammation, since—setting aside their infrequency compared with the frequency of this disease of the lungs—I have often had occasion to observe this variety of tubercle, and to the same extent, in subjects whose lungs were, in every respect, quite sound. Besides, M. Bayle has completely proved that tubercles cannot be regarded either as a termination, or consequence, of inflammation.

It cannot, indeed, be denied that peripneumony, both acute and chronic, sometimes co-exists with

tubercles; it is even probable that this disease may, at one time, be the cause of their devolopment in subjects predisposed to them, and at another, may itself be excited by the irritation produced by a numerous crop of these. Any person at all accustomed to the examination of bodies after death must admit these positions; yet it is, nevertheless, satisfactorily proved by a multitude of facts, that the growth of tubercles in the lungs most commonly takes place without any previous inflammation, and that, when inflammation is found contemporaneous with these, it is generally posterior in its origin.

To convince us of the truth of this observation, we have only to attend to the progress of tubercles in scrophulous glands, which we frequently find to remain swollen for a very long time, without the least redness, not only of the surrounding skin, but even of the gland itself. It is often not till after several years that inflammation comes on, which then seems to accelerate the softening of the tuberculous matter. Sometimes, however, this takes place, and the matter is even evacuated, without the supervention of what can properly be called inflammation. When this does occur it has evidently its seat in the tissues surrounding the scrophulous gland, and not in the gland itself.

Another proof, equally strong, of what has just been advanced, is afforded by the simultaneous existence of tubercles in different organs of the same subject. In consumptive patients it is very uncommon to find the tubercles confined to the lungs: almost always they occupy the intestinal coats, at the

same time, and are the cause of the ulceration and consequent diarrhœa so general in this disease. There is perhaps no organ free from the attack of tubercles, and wherein we do not, occasionally, discover them in our examination of phthisical subjects. The following are the parts in which I have met with these degenerations, and I enumerate them in the order of their frequency: the bronchial, the mediastinal, the cervical, and the mesenteric glands; the other glands throughout the body; the liver—in which they attain a large size, but come rarely to maturation; the prostate—in which they are often found completely softened, and leave, after their evacuation by the urethra, cavities of different sizes; the surface of the peritonæum and pleura, in which situations they are found small and very numerous, usually in their first stage, and occasion death by dropsy before they can reach the period of maturation; the epididymis, the vasa deferentia, the testicle, spleen, heart, uterus, the brain and cerebellum, the bodies of the cranial bones, the substance of the vertebræ or the point of union between these and the ligaments, the ribs, and, lastly, tumours of the kind usually denominated *schirrus* or *cancer*, in which the tuberculous matter is either intimately combined with, or separated in distinct patches from, the other kinds of morbid degeneration existing in these.

Tubercles are found more rarely in the muscles of voluntary motion than in any other part. The most remarkable case of this sort I have met with, was that of a consumptive patient who had tubercles in almost every situation mentioned above, and who

had. besides, the ureters so much dilated as to receive the thumb, and their internal coat converted into an adhesive layer of tuberculous matter. In this person the lower extremity of one of the sterno-mastoid muscles was converted into tuberculous matter, firm and consistent. In this case the muscular structure was still preserved in the parts most altered. In the parts least altered, and which passed by insensible gradation into the sound portion, the tuberculous matter was in its early stage, grey and semi-transparent. I had particularly attended to this man's case; he never complained of pain in the neck, but merely some difficulty in moving it. At the same time the cervical lymphatic glands were full of tubercles and much enlarged.

Almost all the cases given in M. Bayle's treatise, afford examples of the simultaneous development of tubercles in different parts of the body, without there being discoverable in the affected parts either pain or any symptom of inflammation. The same is true of the tubercles of the lungs, which scarcely ever occasion any disorder until they have become numerous and large.

From all this it follows, that we must either admit that tubercles are *not* a termination or a product of inflammation, or agree to receive this word in a sense as general and vague as that of *irritation*, or even to consider it as synonymous with *cause*:—a mode of proceeding which seems to possess no advantage whatever. There is sufficient obscurity already in the etiology of disease without augmenting this by forced relations. The above remarks respecting in-

flammation are equally applicable, as has been well shown by M. Bayle, to several other diseases, both general and local, which have been assigned as causes of consumption;—such, for instance, as Syphilis, Hooping Cough, Eruptions, Hæmoptoe and Catarrh. These affections may accelerate the development of tubercles already existing; they may even sometimes be the occasion of their development, but this can only be in subjects primarily predisposed to them. The real cause, like that of all other diseases, is probably beyond our reach.

M. Bayle does not seem to have been well acquainted with the different modes of development of tubercles, as above described. This appears to be owing to his not having paid sufficient attention to the grey semi-transparent character of them in their early stage, and the true relation between these and the yellow opaque tubercles.

On the other hand, he has been, perhaps, too much struck with one variety of these tubercles, those, namely, which he has described under the name of *miliary granulations.* These are, no doubt, very remarkable by their want of colour, transparency, distinct round or oval shape, smooth and shining surface, great hardness, uniformity of size, and infinite number spread through the whole lungs, (healthy in other respects,) or a great part of them, without their being ever found united or grouped together. They look as if they had all been produced on the very same day, not one of them being more advanced than another.

M. Bayle has however evidently been deceived in

considering these granulations as different from tubercles; still more so in classing them with morbid cartilaginous bodies (cart. accidentels). If this opinion were correct, we should see them occasionally converted into bone, which is never the case. But, indeed, an attentive examination shows them to be tubercles. In the centre of those least transparent we can discover a yellow opaque point, which is obviously the commencement of the passage to the second or mature stage. M. Bayle himself cites a strong example of this (case 4).

Besides, in some cases, we find the lungs completely filled with very small, equal-sized tubercles, but opaque, yellow, and occasionally in a well-marked state of maturation. M. Bayle gives also an example of this kind, (case 16), although he pretends to distinguish this variety from that of his *miliary granulations*. The only difference, in my opinion, between them, is the difference that exists between the green and ripe fruit. Besides, these miliary granulations are never found but in lungs which contain other and larger tubercles, whose advanced stage incontestibly proves their character.

The progress of tubercles in different organs affords a sufficient number of facts, to prove, that in their first and earliest stage, these foreign bodies are always diaphanous or semi-transparent, colourless, or at most slightly greyish. This is often the case with the tubercles observed on the surface of the pleura and peritonæum. On the contrary, these have sometimes an opaque yellow spot in the centre, and, on other occasions, they are converted into

tuberculous matter more or less soft. All these varieties are observed on the same membrane. The same varieties of miliary tubercles are found in the bottom of the intestinal ulcers of consumptive patients. Lymphatic glands containing tubercles have often a slight degree of semi-transparency and pearl colour in the tissue surrounding these, a proof and sign of the ulterior degeneration of the whole gland. Bayle has found the spleen filled with small greyish bodies, which he himself considers as tubercles.

Besides the effect of the various degrees of development, other accidental causes may affect the colour of tubercles. Icterus renders them yellow, especially at the surface, and this is chiefly in the liver. Gangrene in their vicinity, and also the black pulmonary matter, blackens them in a greater or less degree. More especially those found in the bronchial glands are often tinged with a deep black, which is seen gradually fading into the natural colour of the tubercle. Most miliary tubercles, whether semi-transparent, or yellow and opaque, have a small dark spot in their centre, which disappears as they enlarge. This condition must not be confounded with *melanosis,* as will be shown more particularly hereafter.

When there exists a great number of tubercles, even very small ones, in the lungs, death will sometimes take place before any of them have arrived at the stage of maturation, and consequently before these can have formed any ulcerous excavation.

When, on the contrary, there is only a small number of tubercles, we sometimes find them all evacu-

ated and hollow on examination after death. In the majority of cases, however, the development of tubercles is evidently successive, so that, on examination, we generally find these bodies in the different stages we have described, viz: 1. granular, grey or colourless, and semi-transparent; 2. grey, but larger, and yellow and opaque in the centre; 3. yellow and opaque throughout, but still hard; 4. soft, especially towards the centre; and, lastly, cavities more or less completely empty.

SECTION SECOND.

Of some ulterior changes in certain cases of the Tubercular Disease; and on the curability of Phthisis.

To many practical physicians, who are not anatomists, the possibility of a cure taking place after the formation of an ulcerous excavation in the lungs, may seem quite admissible. This opinion, however, will, in all likelihood, appear quite absurd to those who have paid much attention to morbid dissection.

Previously to the knowledge of the true character and mode of development of tubercles, and while consumption was considered simply as a consequence of the chronic inflammation and slow suppuration of the pulmonary tissue, medical men did not question (any more than the vulgar now do) the possibility of curing this disease by a suitable mode of treatment, especially if *taken in time*, and during the *first stage* of it. It is now, however, the general opinion of all those who are acquainted with the actual state of

our knowledge respecting the pathology of diseases, that the tubercular affection, like cancer, is absolutely incurable, inasmuch as nature's efforts towards effecting a cure are injurious, and those of art are useless. Bayle, in particular, advocates the incurability of this disease; he, however, admits the possibility of its being almost indefinitely prolonged.

The observations contained in the treatise of M. Bayle, as well as the remarks made in the preceding chapter, on the development of tubercles, sufficiently prove the idea of the cure of consumption in its early stage to be perfectly illusive. Tubercles tend essentially to encrease in size and to become soft. Nature and art may retard or even arrest their progress, but neither can reverse it. But while I admit the incurability of consumption in the early stages, I am convinced, from a great number of facts, that, in some rare cases, the disease is curable in the latter stages, that is, *after* the softening of the tubercles and the formation of an ulcerous excavation.

Occasionally, while examining the lungs of subjects that had suffered from chronic catarrh, we find irregular cavities lined by a semi-cartilaginous membrane in all respects similar to that described above, and these cavities accord perfectly with the tuberculous exulcerations, except that they are empty. In carefully investigating the history of such subjects, we find that they all refer the origin of their catarrh to a violent anterior disease which bore the character of consumption, so strongly as to make their case, at the time, be considered desperate.

On the other hand, in subjects dead of consump-

tion, whose disease had lasted very long, several years for instance, we very commonly find similar excavations entirely lined by semi-cartilaginous membrane, and free, or almost free, from tuberculous matter. In the same lung we shall also find excavations having the cartilaginous membrane much softer and less complete, and still containing a considerable quantity of tuberculous matter; while other excavations are observed almost filled with the puriform tuberculous fluid, and with scarcely any of the cartilaginous lining. In conjunction with all these we almost always find tubercles in various degrees of muturation, and even in their miliary and semi-transparent stage. This reunion of tubercles in all their various degrees of developement, considered in conjunction with the slow progress of the disease, decidedly proves, in my opinion, that the tubercles have been developed at different periods; and that the oldest—those, namely, which have given rise to the empty ulcerous cavities lined by the cartilaginous membrane—have originated, in many cases, several years before the others.

The formation of this semi-cartilaginous membrane on the surface of tuberculous excavations, must be considered, in my opinion, as a curative effort of nature. When completely formed it constitutes a sort of internal cicatrix analogous to a fistula, and is, in many cases, not more injurious to health than this species of morbid affection. All the persons whose cases I noted above died of diseases not referrible to the pulmonary organs. They had all lived a greater or less number of years in a very supportable state

of health, being merely subject to a chronic catarrh. Some indeed had more or less of dyspnœa, but without any fever or emaciation.

I have at present under my care several patients affected with chronic catarrh, and who afford distinctly the sign of *pectoriloquism* *, although they have in no other respect any symptom of consumption. I have met with several other cases, wherein this phenomenon was observable along with a slight habitual cough, very little expectoration, and scarcely any marked alteration in the general health. In a lady formerly a patient of M. Bayle eight years since, and whose case was decidedly consumption (as appears from M. Bayle's notes in her possession), the sign of *pectoriloquism* is most distinct. This lady recovered beyond all expectation; she is now stout, and the only symptom she has at all referrible to the lungs, is a slight cough. I have no doubt that the cartilaginous excavations above described exist in this person's lungs.

In proof and explanation of what we have advanced in this section, I shall here give a brief notice of five cases that have come within my own observation.

Case 1. A woman, aged 68, laboured under an affection of the chest for many years, chiefly marked by copious expectoration and dyspnœa, and called by her asthma. Along with other morbid appearances, there were found two large ulcers or excavations in the lungs perfectly lined by the cartilaginous membrane as above described.

* For an account of this particular sign, which the author considers quite pathognomonic of that stage of Phthisis when the tubercles are evacuated, see PART SECOND.—Trans.

Case 2. A man aged 32, brought to the hospital for a maniacal affection, died a few days after comatose. On examining the body sufficient cause of death was detected in the brain, and the following appearances were found in the lungs. The left lung much less than the right, and containing a few tubercles in the first stage. The right lung containing in like manner tubercles in different stages, and also an excavation large enough to contain an egg. This was filled by a clot of blood, and was completely lined by the cartilaginous membrane above described.

Case 3. A woman aged 42, long subject to cough, difficult breathing, and expectoration, died of an aggravation of the symptoms. The left lung contained a few tubercles past the first stage, and a small excavation, of the size of a filbert, lined by a soft white membrane, and filled by tuberculous matter, partly of the consistence of cheese and partly puriform. The right lung contained a cavity of the size of a walnut completely lined by the semi-cartilaginous membrane, communicating with the air cells by one bronchial tube of the size of a crow-quill, which was partly obstructed by a calcareous concretion. The lung contained a few more similar concretions, but was not in other parts much diseased.

Case 4. A lady aged 48, was subject for several years to severe attacks of pulmonary catarrh, which usually became chronic, and reduced the patient considerably. Latterly she had been much better. In July 1818, she seemed to have all the symptoms of incipient tubercular phthisis. In February 1819, a great expectoration supervened and continued a month, after

which time she began gradually to amend, and finally recovered completely. After the period of the expectoration the symptom of *pectoriloquism* was observable and still continues very distinct. She has little cough and less expectoration.

From considering the foregoing observations, the shape of the pulmonary fistulæ, the smooth and polished surface of their lining membrane, and the analogy of fistulæ in other parts of the body, we might naturally be led to suppose that the formation of the semi-cartilaginous membrane is the last effort of nature towards a cure, after the formation of an ulcerous excavation in the substance of the lungs, and that it is impossible for the walls of a cavity lined by such a membrane to unite and cicatrize. The following case, however, leads me to the contrary conclusion.

Case 5. A patient, admitted into the hospital for a diarrhœa, and who was observed during the time he remained there to have also a cough and expectoration, died suddenly of an apoplexy, the cause of which was found in the brain. Both lungs contained tubercles, and in the left lobe was found a cavity sufficient to hold an almond in its shell, into which several bronchial tubes opened, lined exactly as those already described by the semi-cartilaginous membrane. In the other lobe there was found, on its superior part, a deep hollow on the external surface, which, on further examination, was found to be connected with an internal cicatrization. From the centre of the depression a cartilaginous band, half a line in thickness, passed inwards, and, after the

space of half-an-inch, divided into two portions so as to form a cavity or cyst capable of containing an almond, and then these two re-united and formed one band as at the opposite extremity. This cavity was half filled by tuberculous matter, of a yellowish white colour, opaque, friable, and much drier than usual. (See fig. 4, plate II.)

The foregoing condition of parts appears to me evidently produced by the imperfect union of the membrane lining two sides of an ulcerous excavation, and which has been rendered imperfect by the portion of tuberculous matter still remaining in it at the period of union. This must be regarded as a very rare occurrence. It is the only one of the kind I have met with. It is, however, not at all uncommon to find in different parts of the lungs, especially in the upper part of the superior lobes (in which situation tubercles are well known to be of most frequent occurrence), bands composed of a condensed cellular substance, intermixed sometimes with fibrous, or fibro-cartilaginous portions, which by their whiteness form a striking contrast with the natural tissue of the lungs. These bands have every resemblance to cicatrices in the pulmonary substance. Sometimes, in place of these bands, we observe masses, of various size, of condensed cellular or fibro-cartilaginous substance. Commonly, the substance of the lungs in the vicinity of these accidental productions is much more impregnated with the black pulmonary matter than elsewhere; so much so, that it would seem as if the formation of such foreign bodies were necessarily accompanied by an extraordinary secretion of

this peculiar matter, which ought not to be considered as a morbid production. The parts most deeply impregnated with this matter are commonly more flabby and less crepitous than natural, and have intermixed with them fibro-cartilaginous bands. It is not uncommon to find in such lungs concretions of a bony or earthy nature.

I had often observed the above state of things without knowing to what to attribute it, and without attaching much importance to the appearance; but after I was convinced of the possibility of cure in the case of ulcerations of the lungs, I began to fancy that nature might have more ways than one of accomplishing this end, and that, in certain cases, the excavations, after the discharge of their contents, by expectoration or absorption, might cicatrize in the same manner as solutions of continuity in other organs, without the previous formation of the demi-cartilaginous membrane. In consequence of this idea I examined these productions more closely, and came to the conclusion, that, in every case, they might be considered as cicatrices, and that, in many cases, they could hardly be conceived to be any thing else.

In all such cases of supposed cicatrization, I found on the superficies of the lung, at the point nearest to such cicatrice, a depression of greater or less extent, with a hard and irregular surface, furrowed by linear marks, which sometimes exhibited an irregular network or embroidery, and sometimes resembled the mouth of a purse by their common union in one centrical point. In the same point there are usually found adhesions between the pleura of the ribs and lungs.

These depressions are found most frequently on the posterior or exterior side of the upper lobes. When they are very deep, it sometimes happens that the anterior part of the lobe, drawn upwards and backwards by the apparent loss of substance and consequent falling in of the part, overlaps the depressed portion like the crest of a helmet. The posterior portion of the lung has sometimes the same appearance, but in a manner much less strongly marked. (See fig. 1 and 2, plate III.)

Whatever resemblance these *depressions* may have to cicatrices, I do not consider them as really such, but rather as analogous to those depressions met with in schirrous mammæ, which are, in like manner, occasioned by the diseased action going on in the substance within. In the one case the surface of the lungs, in the other the skin is retracted by the shrinking of the subjacent parts.

In carefully examining such lungs as showed similar depressions on their surface, I have invariably found, at the depth of half a line, a line, or two lines at farthest, a cellular, fibrous or fibro-cartilaginous mass similar to those described above. The pulmonary tissue comprehended within this (depressed) space is almost always flabby, and not crepitous, even in cases where there is no sign of congestion nor of impregnation with the black pulmonary matter. Every where else, however, in the vicinity of these productions, the lung is generally quite sound.

In tracing the bronchial tubes near these masses I have observed that such as held a direction towards them were commonly dilated. In some cases I have

been able to trace them, as also blood-vessels, into the fibro-cartilaginous mass, with which, although obliterated, they formed but one substance. (See pl. II. fig. 2 and 3.) This fact seems to me to leave no doubt of the nature of these productions, and of the possibility of cicatrization in ulcers of the lungs. It further proves, that a bronchial tube may traverse a tubercle, and afterwards a tuberculous excavation, without being destroyed;—a case, however, as we have already observed, which is extremely rare. Those wrinkled depressions, then, on the exterior surface of the lungs, are not themselves cicatrices, but the consequence of a true cicatrization in the interior of the lung.

These cicatrizations, especially when complete and composed of a substance analogous to other natural tissues, produce no symptoms whatever that can denote their existence. I have only remarked in some cases, when there was reason to believe their existence, that the respiration was less distinctly audible in the supposed diseased point. In such instances, also, where there is much of the black pulmonary matter intermixed, and still more where there are calcareous concretions, there generally exists a small degree of cough, and an expectoration of mucus which is very viscid, semi-transparent and marked by dark dots.

The two following cases afford remarkable instance of these pulmonary cicatrices.

Case 6. A man, aged 65 years, came into hospital affected with slight pulmonary symptoms, chiefly marked by dyspnœa, to which he had been long

subject, and which he considered as asthma. At first he coughed but little, and had scarcely any expectoration. After remaining in the hospital two months, with no very marked pectoral symptoms, he was seized with peritonitis, &c. and died. Besides some fluid in the cavity of the pleura—very general cellular adhesions between it and the lungs—and the production of some albuminous membranous concretions, the following evident cicatrization was found in the left superior lobe. In a point where this adhered to the pleura by a cellular tissue, there was an irregular depression, in the centre of which lay a small ossification. From this point could be traced into the substance of the lung a band of very white cellular tissue, very dense, yet scarcely amounting to the consistence of a membrane. This band was about an inch long, six lines broad, and three or four thick. Its white colour formed a striking contrast with the natural pulmonary tissue. Some bronchial tubes of the size of a crow-quill, or larger, terminated, and became lost in this band. An accidental circumstance prevented me from examining this substance more minutely.

Case 7. A labourer, aged 62, had been affected five years with an habitual cough, but was otherwise of a good constitution. He was suddenly attacked with peripneumony, which carried him off on the fifth day, he having been admitted into the hospital only the day before. On examination after death, the lungs, exclusively of the peculiar characters denoting recent pulmonic inflammation (which will be particularly noticed in another place), and of some old adhesions,

presented the following appearance. On the top of the right lung there was a fibro-cartilaginous mass, three lines in thickness in the centre, which connected it with the pleura of the ribs. In the same lobe, included in the pulmonary tissue and strongly adhering to it by continuity of substance, there was found a fibro-cartilaginous mass of a similar kind, of the size of a walnut, and of an irregular conic shape. This mass was of a brilliant white colour and opaque, and formed a striking contrast with the surrounding pulmonary tissue, which contained an unusual quantity of black pulmonary matter. That part of the pulmonary substance interposed between it and the superficial mass about two lines in thickness, was quite black, and was quite destitute of air, although its texture was very perceptible. This fibro-cartilaginous mass, when cut into, presented all the characters of a pulmonary cicatrice. Several bronchial tubes terminated and were obliterated in its substance. Two, especially, which terminated in it in forming a cul de sac, were of the size of a goose-quill. One of these, after forming the cul de sac of a diameter of two lines, became all at once contracted to a size scarcely equal to that of a crow-quill, on entering the tumour, into which it could be traced half an inch. In this tract, however, its cavity was entirely obliterated, and it resembled in colour and texture the tumour, from which it was only distinguished by the direction of its fibres, or by a slight shade of colour which pointed out both its coats and its obliterated canal. (See plate II. fig. 3.)

In the superior lobe of the left lung there was a

small cavity capable of containing a filbert, lined by a fine semi-transparent membrane, of a demi-cartilaginous consistence, and through which the black pulmonary matter could be distinguished. This excavation contained a small quantity of tuberculous matter, friable, and of the consistence of soft cheese. The pulmonary tissue amid which it was placed was perfectly sound and crepitous. Near the origin of the bronchia was observed a single tubercle of the size of a barley-corn, softened to the consistence of soft cheese, and surrounded by a dense membrane, greyish or semi-transparent, of the nature of semi-cartilaginous bodies, or imperfect cartilages.

The foregoing observations prove, I think, that tubercles in the lungs are not in every case a necessary and inevitable cause of death; and that a cure may take place in two different ways, after the formation of an ulcerous excavation:—first, by the cavity becoming invested by a new membrane; and secondly, by the obliteration of the excavation by means of a cicatrix, more or less complete, consisting of cellular, fibrous, or cartilaginous substance.

The identity of the excavations observed in the 1st, 2nd, 3rd, 5th, and 6th case, leaves no question that they had one and the same origin, namely, in the maturation and discharge of the tuberculous matter originally contained in them. The first case may be considered as affording an example of a perfect cure, since no more tubercles existed in the lungs. The same may be said of the 7th,—inasmuch as there was only one very small tubercle in the lungs. The subjects of the 2nd, 3rd, and 5th cases would, no

doubt, have had relapses of their disease, since their lungs all contained tubercles more or less advanced, and which, necessarily, must have been eventually developed. This development, however, might have been remote; since it has been truly shown by M. Bayle, that immature, and still more, *miliary* tubercles, continue to exist for a great many years without materially affecting the general health.

Were it in our power to ascertain the previous history of such cases as exhibit these cartilaginous excavations and cicatrizations in the lungs after death, we should, in all probability, find that the patients had been subject to a long continued cough, and severe catarrh, or even to a disease considered at the time as true consumption, and which had been very unexpectedly cured. These morbid appearances, at least, sufficiently explain the fact of the seemingly intermittent character of certain cases of consumption, and the extraordinary cure of others.*

These pulmonary fistulæ and cicatrices are very common, as any one will be convinced who practises morbid dissections in an hospital for any length of time. I have only mentioned a few of those that I have met with lately; and, indeed, it is only lately that I have paid any minute attention to such appearances. I had, however, frequently met with them long before, and have, indeed, partly described them in another place.† They are very various in their appearance; still it would seem that it is espe-

* I am aware that Phthisis may be closely simulated by a common catarrh. I shall notice a case of this kind hereafter, and M. Bayle details two in his work, viz. cases 48 and 49.

† Dict. des Scienc. Med. Art. *Cart. Accident.*

cially by the production of this *extraneous cartilaginous* tissue that nature attempts a cure of tuberculous excavations. With this end she seems occasionally to throw out a superabundance of it; as the exterior portion of the lung is sometimes coated with it, as in one of the cases already detailed. On other occasions the cartilaginous walls of the cavity are observed of very unequal thickness,—as thick in some places as half an inch or an inch,—as if the remedial powers of nature were undetermined whether to form a perfect cicatrix or only a fistula. (See plate III, fig. 3.)

The merely temporary cure of many phthisical cases is readily explained, as above remarked, by the cicatrization of a softened tubercle, and by the eventual softening of others which were only in their first stage at the period of the cicatrization of the first. For example, we can easily fancy that the subject of case 5th, detailed above, had he not been carried off by another disease, might, after the perfect cicatrization of the cavity in the right lung, have enjoyed tolerable health for several years, until the ultimate maturation of the miliary tubercles. The following is a brief note of a case of this sort:—

Case 8. In 1814 M. Recamier and myself were consulted by a young lady who had every symptom of pulmonary consumpton, such as frequent cough, purulent expectoration, much emaciation, hectic fever and night sweats. Several of the lymphatic glands of the neck were swollen, and for a few days she had been affected with very severe diarrhœa. Astringents, sulphur-baths, and ass's milk were prescribed. In

the course of two months her strength, flesh, and colour were quite restored, the cervical glands were diminished by one half, and, in short, she was in a state of perfect health. She passed the winter very well, but in April the cough and all the other phthisical symptoms returned, and she died in the end of summer.

Such examples of perfect, though only temporary cures of consumption are rare; but it is by no means unusual to find persons affected with all the symptoms of this disease surviving for many years, alternately experiencing imperfect convalescences and relapses more or less severe. It is such cases M. Bayle had in view when he said consumption may continue forty years. These imperfect cures may, I think, be attributed to the successive softening of several tubercles, and their subsequent conversion into fistulæ; whilst the more perfect, though still temporary cures, may depend on the formation of a cicatrix. The results of these two kinds of cure, as far as I am able to judge from the cases I have met with, seem to me to be the following:—the cure by fistulæ usually leaves behind it a chronic catarrh, more or less severe, and accompanied by an expectoration which is sometimes very copious; cicatrization, on the contrary, produces no other inconvenience than a dry cough, neither frequent nor severe. Sometimes, indeed, there is no cough, especially where the texture of such cicatrices clearly resembles that of other natural tissues in the animal economy, especially the cellular or fibro-cartilaginous. When, however, the substance of the cicatrice is less perfect, and more

remote from the healthy tissues of the body, and when it is impregnated with much of the black pulmonary matter, we find an habitual cough, either dry or accompanied by a mucous expectoration, and cachectic condition of the body.

When we consider that the formation of tubercles in the lungs seems to be the consequence of a general diathesis; that these are frequently found contemporaneously in the intestines, where they ultimately occasion ulceration and colliquative diarrhœa; and that, in some cases, also, they exist in the lymphatic glands, the prostate, the testicles, the muscles, bones, &c; we must be led to believe the most perfect cure that can take place in consumption as merely temporary. Admitting, however, the justness of this conclusion in those extreme cases of tubercular diathesis (which, after all, are but rare when compared with the vast number of consumptions), we are still entitled to hope for the cure of many cases of phthisis, or at least, for such a suspension of their symptoms as may be deemed almost equal to a cure, since the individuals may enjoy such a state of health as may enable them to fulfil all the duties of civil life, for several years, or until such time as a fresh development of tubercles, at present immature, produces a fresh and final seizure.

It is further worthy of remark, that, although in the majority of the subjects in which I have observed these fistulæ and cicatrices, the lungs contained tubercles in different stages of their progress, and, consequently, a certain though perhaps remote cause of a return of the disease, still I have found the same

marks of a cure in subjects in whom there were no tubercles whatever, neither in the lungs nor in any other organ. In such instances it may be supposed, perhaps, that the excavations had been the product of simple inflammation of the pulmonary tissue, and not of tubercular degeneration. Such a supposition is, however, quite gratuitous. Those accustomed to much morbid dissection have almost daily experience of the formation of these membranes on the surface of tuberculous excavations; while the formation of pus, or true abscess of the substance of the lungs, is so extremely rare (as we shall see more particularly when treating of peripneumony) as to be justly esteemed one of the most extraordinary appearances in morbid anatomy, and, therefore, quite inadequate to account for an occurrence so common as that of fistulæ and cicatrizations of the lungs.

These considerations ought to induce us still to entertain some hope in those cases of consumption wherein we have reason to believe the greater portion of the lungs remains still permeable to the air. Although we are, therefore, certain that a subject that is *pectoriloquous* has an exulcerated cavity in the lungs, we are not, on this account, equally certain that this will prove fatal.

We may even be justified in believing that a case, wherein all the ordinary symptoms of consumption exist *together* with *pectoriloquism*, is more favourable than one in which they exist without this peculiar phenomenon; since, in the first case, we may attribute the symptoms to the efforts of nature in maturing and evacuating the tuberculous matter, and may hope

for their cessation when this is effected, provided the greater portion of the lungs is in other respects healthy, (as we can ascertain by the *stethoscope* *); while, in the second case, we must imagine that the tube cles are very numerous, since they produce such violent general effects previous to the period of their softening, and that therefore they will, in all probability, occasion death before the epoch of possible cure arrives.

The two following cases, as well as the others already related, prove the curability of Phthisis.

Case 9. An English gentleman, aged 36, detained in Paris as prisoner of war, in September 1813 had an attack of hæmoptysis, followed by a cough, at first dry, but, in the course of a few weeks, accompanied by purulent sputa. To these symptoms were added a well-marked hectic, considerable dyspnœa, night sweats, emaciation and great debility. The hæmoptysis returned, in a slight degree, now and then, and in December he had diarrhœa. In the beginning of January he was so much reduced that both M. Hallé and Bayle agreed with me in opinion that his death might be daily looked for. On the 5th of January, during a severe fit of coughing, and after bringing up some blood, he expectorated a solid mass, of the size of a filbert, which, on examination, I found to be evidently a tubercle in the second stage, surrounded by a portion of the pulmonary tissue, such as has been already described as impregnated with grey tubercular matter in the first stage, often met with around these bodies when large. This patient

* The instrument for ascertaining the existence of *pectoriloquism*. See Part II. Trans.

remained in the same degree of extreme emaciation and debility all January; but in the beginning of February the perspirations and diarrhœa ceased spontaneously, the expectoration sensibly diminished, and the pulse, which had been constantly as high as 120, fell to 90. In a few days the appetite returned, the patient began to move about in his room, his emaciation became less, and, against the end of the month, his convalescence was evident. In the beginning of April he was perfectly recovered; and his health has continued good ever since, without even the least cough, and without his being at all particularly guarded in his climate or regimen. In 1818 this patient again consulted me for a different complaint, and I took the opportunity of examining his chest by means of the *stethoscope*. The only thing I could detect was the comparative indistinctness of respiration in the superior portion of the right lung. There was no pectoriloquism. From these circumstances I am of opinion that the excavation which contained the expectorated tubercle must have been cicatrised; and as the total absence of cough, dyspnœa and expectoration for four years, forbids the supposition of the existence of others in the lungs, I think we have a right to consider this patient as perfectly cured.

I think there can be no doubt that had this patient been examined by the *stethoscope* after the expectoration of the tubercle, he would have been found pectoriloquous, and the subsequent cessation of this phenomenon would have indicated the formation of a cicatrice. And I am convinced that

when the use of this instrument shall have become more general, the development and subsequent cessation of pectoriloquism will be often detected, not only in cases of decided phthisis, but also in many cases of obstinate cough, which are usually rather dreaded as a cause of the future development of tubercles, than as a sign of their actual presence, and which are found to get well after a longer or shorter continuance.

Case 10. This case is detailed in M. Bayle's treatise (see case 54), and is that of a gentleman who, after having experienced all the symptoms of consumption in the greatest degree, perfectly recovered by change of air and living by the sea-side. As both M. Bayle and myself (for this was my patient) then conceived the cure of phthisis impossible, we considered the case as one of chronic catarrh, and it is so entitled in M. Bayle's book. Since then I have had an opportunity of satisfying myself, by means of the cylinder, that our patient had had more than a mere catarrh. His respiration is quite perfect throughout the whole chest, except at the top of the right lung, in which point it is totally wanting. On this account I am certain that this portion of lung had been the seat of an ulcerous excavation, and that this had been replaced by a complete and solid cicatrice. The health of this gentleman continues good, although he has often occasion to speak in public. He has sometimes a little dry cough, on the change of weather, but takes cold very seldom.

SECTION THIRD.

Of Vomicæ, and the Expectoration of Tuberculous Matter.

The morbid condition usually denominated *Vomica*, is one better known in theory than it is common in practice: its phenomena are readily explained by the cicatrization of the tuberculated cavities, or the formation of fistulæ as above described. By the term vomica, we commonly understand a sudden and abundant expectoration of purulent matter, supervening upon a disease which had all the usual symptoms of an incipient consumption. In these cases we sometimes find, after an expectoration so copious as would almost, in the course of twenty-four hours, fill one of the cavities of the chest, the cough gradually lessen after a few days, the sputa decrease in like proportion, and the patient gradually recover a complete and durable state of health. More commonly, however, the amendment is merely temporary, and the return of all the bad symptoms puts an end to the patient's life.

Cases like these had attracted the attention of medical men in the very infancy of the art. Hippocrates treats of them at great length in different parts of his writings. He considered vomicæ as true abscesses of the lungs, and, in consequence, designated those affected with them, *empyical* or *suppurated;* a term which he extended to this particular affection, in

whatever organ it might be seated, but which has been confined, by modern surgeons, to purulent collections in the cavity of the pleura. He seems to have considered such a disease as different from phthisis. He imagined that the abscess might be evacuated either by the bronchia or into the cavity of the pleura. The former termination appeared to him fortunate, and he sometimes attempted to produce it by the succussion of the patient's body: the second termination he considered as the usual cause of empyema.

These notions, very incorrect in many respects, are still held by many medical men unacquainted with morbid anatomy. They are especially false in respect of the origin of the pus, since, as I have already observed, and as I shall more fully prove hereafter, the formation of an abscess or of a collection of pus in the substance of the lungs, as a consequence of inflammation, is an extremely rare case;—at least a hundred times less frequent than a well-marked vomica, and a thousand times rarer than a case of empyema.

I consider vomicæ, such as are met with in practice and as I have described, as produced by the softening or solution of a tuberculous mass of great extent. The copious expectoration, however, which usually continues for several days after their rupture, cannot be considered as entirely supplied by the tuberculous contents of the excavation. A patient, who had been affected for several months with a dry cough, dyspnœa, hectic fever, and other symptoms indicative of the existence of immature tuber-

cies, during a violent fit of coughing suddenly expectorated a glass full of pus. For eight days he spit up, during every twenty-four hours, about three pounds of a similar fluid. After this the expectoration diminished gradually, and finally ceased along with the other symptoms, and the patient was discharged, at the end of a month, perfectly cured. An expectoration so copious as this can only be explained by a continuous secretion; and in the particular case just mentioned the matter was, doubtless, furnished by the walls of a very extensive tuberculous excavation, and probably, also, by the bronchia, irritated by the tuberculous matter. It is also probable, that, in this instance, the termination of the expectoration was owing to the cicatrization of the cavity.

The case of a vomica, as usually characterised in practice, and which is justly considered as of rare occurrence, differs merely in degree of intensity from a condition which is very common, and which may be frequently observed by any one who takes the trouble to observe and compare the sputa of a number of phthisical patients at one time, as can be done in the wards of an hospital.

The truth is, that phthisis, considered relatively to the expectoration, presents two very distinct stages during its progress. In the first, the cough is dry, hard, and fatiguing; or, if there be expectoration, the sputa are entirely supplied by the saliva, and mucus from the [bronchia] mouth and throat. The reunion of these may form a copious expectoration, which will be transparent, colourless, liquid,

ropy, and somewhat frothy at top. To this there will be occasionally superadded a little of that grey, viscid, semi-transparent matter, often mixed with black specks, to which we commonly give the name of *bronchial mucus*. When this takes place the expectoration is very scanty; otherwise, it is often abundant. Both these kinds of expectoration indicate the existence of immature tubercles.

In some cases, however, the expectoration is extremely copious and ropy, but always nearly colourless and semi-transparent. This condition of the expectoration indicates, as has been truly remarked by M. Bayle, the existence of a great number of immature miliary tubercles; but not exclusively, as he imagined, that variety which he denominated *granular*.

In the second stage the sputa put on quite a different character. They then become opaque, of a pale yellow, and sometimes slightly greenish, with more or less of tenacity. Sometimes they perfectly resemble those of a simple catarrh, and, on the other hand, they are occasionally loose and puriform. In some cases we can discover fragments of tuberculous matter imperfectly dissolved. This last character may, perhaps, be deemed quite pathognomonic. It is not, however, so; as portions of a sebaceous, concrete, and friable matter, entirely resembling these, are occasionally formed in the tonsils, and expectorated by many persons in a state of health.*

There are, however, two characters by which these substances may be distinguished: the cheesy matter has usually a peculiar fœtor, and when heated on paper it greases it. These characters are wanting in the tuberculous matter.

The transition from the one stage to the other is sometimes sudden and complete, that is to say, the transparent mucous sputa cease at the instant the yellow and puriform begin to make their appearance. The accession of these last is sometimes accompanied by a slight hemorrhage, and a temporary relief almost always follows. Instances of this kind are not at all uncommon: they offer examples of vomicæ in miniature.

Very often the transition from the first to the second stage is not so distinct as this. The transparent mucous expectoration will frequently continue along with the opaque and puriform sputa; and in this case, if we merely looked to the nature of the discharge, we should be at a loss to decide whether the new sputa originated in the softening of the tubercles, or were produced by the supervention of a pulmonary catarrh upon the old cough of the patient.

These two different conditions of the expectorated fluid are in perfect accordance with the organic affection which constitutes phthisis, since they indicate —first, the crude state of the tubercles; and, secondly, the evacuation of these, by the bronchia, when mature. The first species of sputa is merely the mucus of the bronchia, secreted in greater quantity than usual, on account of the irritation excited by the tubercles contained in the pulmonary tissue; the second species, on the contrary, consists partly (especially in the beginning) of the softened matter of the tubercles, and partly of a purulent or puriform fluid secreted by the lining membrane of the tubercular excavations, and by that of the bronchial tubes

themselves. The truth of the latter part of this statement is proved by the fact that most consumptive patients daily expectorate a greater quantity of sputa, both in weight and volume, than the substance of all the tubercles in their lungs would supply.

The general symptoms of the disease are by no means so exactly coincident, either with the nature of the expectorated matter, or with the extent of disorganization in the lungs. Hectic fever and emaciation sometimes exist in a great degree before the appearance of the puriform sputa, and sometimes even death takes place in this early stage.* On the other hand, a state of comparative robustness and tolerable health shall continue long after the occurrence of the opaque expectoration, and the discovery of pectoriloquism. Indeed, I am led to believe from many facts, that, in the majority of cases of consumption which terminate favourably by the formation of fistulæ or cicatrices, the patients have undergone the different processes of the development, solution, and evacuation of the tubercles, without any suspicion of being affected by a more serious disease than a nervous cough, or, at most, a suspicious catarrh.

There is not one patient in ten that dies consumptive before the complete softening of a part of the tubercles, and, consequently, before the formation of one or more excavations. It is still more uncommon for such excavations to take place without communicating with the bronchia; nay, it sometimes hap-

* See Bayle's Cases 14 and 15.

pens that these organic lesions take place long before any perceptible change in the general health. This fact is readily explained by a reference to the morbid anatomy of the affected organ. The simultaneous existence, in the lungs of almost all phthisical subjects, of tubercles in every stage, from the miliary tubercle to the ulcerous excavation, must convince us that their development is successive, and that some may have reached their last stage at the very period of the formation of others. And we can readily understand how a single tubercle may pass through all the stages of its progress without materially affecting the general health, while a great number of similar tubercles may prove highly deleterious and destructive. We have an instance perfectly analogous to this in the case of scrophulous lymphatic glands: for example, we often observe a single cervical gland to tumefy, and eventually to discharge the tuberculous or scrophulous matter (the development of which had caused the morbid affection), without the general health being at all affected; while the very same disease, when it extends to many similar glands, gives rise to hectic fever, marasmus, and death.

In concluding this discussion I would observe, that the cure of consumption, in cases where the lungs are not entirely disorganized, seems to me to present no character of impossibility, neither in regard to the nature of the disease, nor the nature of the organ affected. In the first place, the tubercles of the lungs differ in no respect from those situated in the glands, and which, under the name of scrophula,

after being softened and evacuated, are often followed by a perfect cure. Secondly, the destruction of a portion of the pulmonary tissue is not necessarily fatal in its nature, since we know that wounds of this organ are frequently cured, notwithstanding the aggravation of the case produced by the perforation of the thorax and admission of air into the cavity of the pleura.

CHAP. II.

OF PERIPNEUMONY, OR INFLAMMATION OF THE LUNGS.

Peripneumony, or Pneumonia, is inflammation of the substance of the lungs. Considered in an anatomical point of view, this disease presents three different varieties, or degrees, very distinctly marked.

In the first, the lung is of a livid or violet colour externally, is much firmer internally, and heavier than in its healthy state. It is still crepitous, but much less so than a sound lung, and, on pressing it between the fingers, we perceive that it is injected by a liquid. When cut into, it appears of a livid red, is quite injected by a frothy serous fluid, more or less sanguinolent, which flows from it abundantly. We can still, however, discover very clearly the natural alveolar and spongy texture of the viscus. This is the condition of lung entitled by M. Bayle, *obstruction*, (engoument).

In the second variety, the lung has entirely lost its

crepitous feel under the finger, and has acquired a consistence and weight altogether resembling those of liver. From this circumstance, modern anatomists have named this condition of the organ *Hepatisation* or *Carnification*. The former of these terms is sufficiently correct; the last is very improper, and would be more applicable to a morbid condition of the lungs to be hereafter described.

In this, the second degree of inflammation, the lungs are frequently less livid externally than in the first variety; but they exhibit in their interior a red colour more or less deep, which forms a striking contrast with the spots of black pulmonary matter, the bronchial tubes, the blood-vessels and air-cells, all visible on the cut surface. The air-cells, especially, which are so indistinct in the natural condition, become very obvious. Their membranous walls seem frequently exempted from the general inflammation, and their whiteness thus renders them very visible.

If we cut into slices a lung so affected, there is scarcely any fluid whatever flows from the incised surfaces; but if we scrape these with the scalpel, we can force out a small portion of bloody serum, which is thicker and less clear than that above described, and in which we can often distinguish a matter still thicker, opaque, whitish and puriform. In examining the incised surfaces in a proper light, we find the lung to have entirely lost the cellular structure, and to have acquired a sort of granulated appearance, as if composed of little red grains, of a roundish and somewhat flattened shape. This species of *granulation* appears to me to be the proper anatomical charac-

teristic of inflammation of the pulmonary tissue by which it can be best distinguished from the tubercular, and from the various other kinds of induration to which it is liable.

When a lung is entirely hepatised it seems, at first sight, to be larger than natural, but this seeming enlargement is merely caused by its not being able to collapse, and its thus continuing to fill the cavity of the pleura. I have often measured the dimensions of this cavity, in cases of pneumonia, both in the dead and living subject, and have never found the slightest degree of enlargement in the side affected; a circumstance, as we shall more particularly see hereafter, which establishes a great difference between this complaint and pleurisy.

It even appears that the lungs when inflamed are totally without any power of impressing, with any force, the surrounding parts, as I have seen, on the surface of a completely hepatised lung, an indentation, of a line in depth, produced by a patch of coagulable lymph, extravasated on the corresponding point of the pleura costalis, and not of firmer consistence than the white of egg boiled.

In the third variety or degree of inflammation, the pulmonary tissue has the same consistence and granular texture as we have just described, but it is of a yellowish pale or straw colour, and discharges, from the cut surfaces, in considerable quantity, an opaque, yellowish, viscid matter, which is evidently purulent, but with a heavy smell which is not nearly so disagreeable as that of pus in an open wound. This is, properly speaking, suppuration of the substance of

the lungs; for, as we have already shown, what are usually considered as such, viz. *vomicæ*, are merely softenings of the matter of tubercles.

In several hundreds of cases of peripneumony, wherein I have examined the lungs after death, I have met with collections of pus in the inflamed organ not more than five or six times. These abscesses were very few in number, and inconsiderable in extent. They were found in cases of the third variety, above described, and were dispersed here and there throughout the lung. Their walls consisted of the pulmonary tissue, injected with pus, and in a sort of putrid condition, which gradually disappeared in receding from the abscess. Once only have I met with an abscess of considerable extent. In this case, the patient died on the twentieth day of his disease. The abscess was seated in the anterior and middle portion of the lung; it was long and flat, and would have contained three fingers. Correctly speaking, it could hardly be said to have any direct boundaries. In proceeding from the centre of the collection the pus became gradually converted into a sort of purulent detritus; a little further on, the pulmonary tissue was more firm, but profoundly gorged with pus: at the distance of half an inch the substance of the lung exhibited merely the common characters of the third variety or degree of inflammation. In this case, as in every other instance of purulent collections in the lungs, the peripneumonic affection occupied only one portion of a single lung. This circumstance may assist us in accounting for the infrequency of such appear-

ances; since we can believe that a partial peripneumony is usually removed by nature or art, while one involving the greater part of the viscus, will prove fatal before it has reached the stage of the entire destruction of any portion of the lung by abscess.

From this decription we perceive the marked difference between such purulent depositions and the cavities formed by the softening of the matter of tubercles. This last, although sometimes resembling pus in colour, commonly differs from it by containing tuberculous fragments of a friable consistence. Besides, the compactness, the exact circumscription of the tuberculous cavities, the soft false membrane which uniformly invests these, and the semi-cartilaginous one which occasionally succeeds it,—all suffice to denote a morbid state of parts very different from that noticed above.

The three varieties of inflammation above described, are very commonly conjoined in different ways. Very commonly one lung is inflamed throughout in the third degree, while the other exhibits only some spots in the first or second degree. Sometimes the three varieties exist in the same lung, dividing it into different zones, which are either very strikingly contrasted, or shaded into one another by insensible gradations.

The transition from one degree to another is marked by the development of some spots of greater inflammation. Thus, the transition from the first to the second is characterised by a red-coloured tissue, containing much frothy and bloody serosity, and still somewhat crepitous on pressure, in the midst of

which we observe some portions of a redder colour, much firmer, not crepitous, containing much less serosity, and presenting granulated surfaces on incision.

The transition from the second to the third degree is marked by yellowish, irregular, uncircumscribed spots, which pass insensibly into the red colour of the second degree of inflammation. This character of the colouring, added to the grey or black striæ arising from the intermixture of the black pulmonary matter, exactly resembles some species of granite, consisting of red and yellow felspar, grey quartz, and black mica.

The lower parts of the lungs are those most commonly affected in peripneumony; and when the disease extends to the whole of them, it is in this part that it almost always commences.

When all the varieties of peripneumony exist in the same lung, the greatest degree generally is observed in the same inferior portion. It is extremely rare to find the inflammation confined to the superior lobe; and it is nearly equally so to find it seated in the centre of the lungs, while the surface throughout retains its crepitous character.

We never find the whole of both lungs inflamed in the third, or even in the second degree; but it is not uncommon to find one whole lung, and half the other, entirely impermeable to the air.

In other cases, on the contrary, death takes place before the fourth part of the lungs is affected by the inflammation; a fact (among many others) which proves that death is often produced by the exhaus-

tion of the vital principle, rather than by the intensity or extent of the local lesion.

Peripneumony, even when it has reached the third stage, or that of purulent deposition, may still admit of cure without disorganization of the pulmonary tissue. In such cases, if the patient happens to die during convalescence, we find the hepatization gone, and only the hardness of the first stage of the disease remaining. The lungs are slightly crepitous, do not always sink in water, and still contain a portion of purulent fluid. The incised surfaces present a dirty yellow or pale green colour, very different from that of the healthy lung. In a still farther advanced period of restoration the same colour remains; the lung still continues more humid than natural, but contains no perceptible portion of pus.

Chronic peripneumony, when uncombined with tubercles or other morbid growth, presents entirely the same anatomical characters as the acute; and it would be therefore extremely difficult, even for those most accustomed to morbid dissections, to form any probable opinion of the duration of the disease from the appearances after death.

The only symptom of peripneumony, that can with any propriety be treated of in this place, is the nature of the expectoration. And of all the symptoms of the disease, this is the only one that can be at all regarded as pathognomonic, since it is the only one that is found exclusively in it. The sputa are white, slightly yellowish, or greenish, somewhat diaphanous, and intermixed with bubbles of air which are retained by its extreme tenacity. This tenacity

is so great that we may often reverse the vessel containing the sputa, and even retain it in this position for a long time, without being able to detach them from its sides.

CHAP. III.

OF GANGRENE OF THE LUNGS.

Gangrene of the lungs is extremely rare. It can hardly be considered as one of the terminations of the inflammation of that viscus, and still less can it be regarded as a consequence of the intensity of the inflammation. In truth, in such cases the inflammatory character is very little conspicuous, either in the symptoms, or in the morbid condition of the injured organ. I would, therefore, say that this disease is allied to those which are essentially or idiopathically gangrenous; such, for instance, as the different varieties of anthrax; and that the inflammation existing around the gangrened part, is rather the effect, than the cause of the mortification.

There are two varieties of this disease, which are both conspicuously marked, as well by their general symptoms, as by their anatomical character;—the *uncircumscribed* and the *circumscribed* gangrene of the lungs. The first is one of the rarest of organic diseases. I have only met with two cases in eighteen years; and I am not aware of more than five cases having been seen in all the hospitals of Paris during the same period. This variety has the following

characters:—the pulmonary tissue is more humid, and much more easily torn than natural, and has the same degree of density as in the first variety of peripneumony; its colour varies from a dirty white or slight greenish, to a deep green or almost perfect black, intermixed, sometimes, with a brown, or earthy yellow colour. These different tints are mixed irregularly in different parts of the lungs, and are, further, interspersed with portions of a livid red, altogether resembling the state of parts in the first degree of peripneumony. Some points here and there are completely softened down to a sort of liquid and putrid mass. A dirty sanies, or greenish liquid, of an insufferably putrid odour, flows from the affected parts when cut into. This affection occupies, at least, the greater part of one of the lobes; sometimes it extends to nearly the whole lung; in no case is it at all circumscribed. In some places, the sound parts of the lung, or, at least, those scarcely altered from the healthy state, pass insensibly into the gangrened portions; in other places, the sound and mortified portions are separated by a band inflamed in the first degree, and, more rarely, by one arrived at the state of hepatization.

The progress of this disease, even when of small extent, is extremely rapid. From the very first the patient falls into a state of complete prostration of strength and oppression; the pulse is small, weak, and very quick; cough rather frequent than strong; expectoration loose, the sputa of a very remarkable green colour, and extremely fetid like that of a mortified limb. The expectoration, very copious at first,

soon ceases through debility, and the patient dies suffocated by the accumulation of the sputa.

The partial or circumscribed gangrene of the lungs differs from the preceding species in occupying only a small part of the viscus, and in having no apparent tendency to extend itself to the surrounding parts. On this account its progress is often very slow; so much so, indeed, as sometimes to give it some resemblance to consumption; and, in truth, it has been ranged by M. Bayle as a species of this disease.

Partial or circumscribed gangrene of the lungs may have its seat in any part of the organ. It ought to be distinguished in three different states: 1st, recent mortification, or gangrenous eschar; 2nd, deliquescent sphacelus; and 3rd, grangrenous excavation, formed by the complete softening down, and discharge, of the gangrened portion.

The gangrenous eschars are very irregular in form, and very variable in size. Their colour is greenish black; their texture more humid, more compact, and harder than that of the healthy lung; they are, in short, completely similar to the sloughs produced by caustic, and exhale strongly the peculiar fetor of mortification. The part of the lung immediately surrounding them exhibits, to a little distance, the first or second degree of inflammation. Sometimes the eschar, during its disorganization, becomes detached, like the slough from caustic, and forms a sort of button or core, of a darkish, greenish or yellowish tint, somewhat filamentous in its texture, and softer and drier than the recent eschar. It remains

isolated in the centre of the excavation formed by the mortified portion.

More commonly the eschar becomes softened throughout, without forming any distinct core, and is converted into a sort of putrid jelly, of a dirty greenish grey, sometimes sanious, and horribly fetid. This matter soon escapes into some of the neighbouring bronchia, and is thus gradually discharged, leaving behind it a true ulcerous cavity.

The interior of these cavities then becomes the seat of a secondary inflammation, which seems to retain for a long time somewhat of the gangrenous character: the surface becomes covered by an extraneous membrane, of a greyish colour, opaque and soft, which secretes either a dirty pus of the same colour, or a black sanies, having the grangrenous fetor.

Frequently, however, this new or false membrane does not exist, the fetid and various-coloured pus or sanies being secreted immediately by the walls of the ulcerous cavity. These walls are commonly firm, of a brownish or greyish red, exhibiting, when cut into, a granulated surface. This state of parts (which is evidently a species of chronic peripneumony, not tending to suppuration,) does not commonly extend more than half an inch, or an inch from the ulcer; occasionally, however, it occupies the whole extent of the lobe in which it is seated. On other occasions the boundaries of the excavation are soft and fungous, and easily destroyed by scraping with the scalpel. Blood-vessels of a considerable size, quite isolated and denuded, yet still sound, sometimes cross these cavities; at other times these

vessels are quite destroyed, and pour from their open mouths a sufficient hæmorrhage to fill the whole cavity with clots of blood.

These grangrenous excavations constitute the ulcerous phthisis of M. Bayle. Although he does not distinctly state their origin, he appears to have suspected it. (See his cases 25—30).

Sometimes the eschar makes its way into the cavity of the pleura, and gives rise to a species of pleurisy usually accompanied by the extrication of air in that cavity. This seems in some cases to arise from the process of putridity alone, but, in others, it is evidently assisted by the access of the external air through the bronchia.

The symptoms of the partial gangrene of the lungs are extremely various, and differ much in different stages of the disease. In the commencement it is marked by the symptoms of a slight degree of peripneumony, but attended with a prostration of strength and degree of anxiety quite disproportioned to the small extent and moderate intensity of the local affection. Later in the disease there are sputa of a green or greenish colour, and of a gangrenous fetor, and followed by expectoration of a purulent fluid of a grey or greenish yellow colour. In both these stages the patient often experiences very severe pain in the chest, and sometimes very copious hæmorrhages from the lungs. The countenance assumes a sallow or rather leaden hue. When the disease reaches the chronic stage, there is constantly present a degree of hectic fever, sometimes high, but commonly less intense than in most consumptive

cases; the skin is hot, sometimes extremely so; the sputa and breath retain something of the gangrenous odour, being excessively fetid, and perceptible at a great distance. In this state the patient often wastes with great rapidity, and his case may then be easily mistaken for true phthisis. More commonly, however, death takes place before emaciation has made great progress, this complaint seeming to have a greater tendency to produce cachexy than marasmus.

I shall here subjoin the heads of four cases of this disease,—the 1st, showing the eschar still entire; the 2nd, in the state of a half-detached core; the 3rd, in the state of deliquescence; and the 4th, exhibiting the rupture of the matter into the pleura and bronchia at the same time.

Case 11. A man, aged 40, was seized, after a fit of intoxication, with pain in his joints, with fever and very violent delirium, which symptoms proved fatal on the 13th day, without any other sign of disease of the chest, but a slight difficulty of breathing, a few days before death. There were found effusion in the ventricles of the brain, and the following appearances in the thorax: the right lung was adherent to the pleura anteriorly and on the diaphragm; the right side of the chest contained about a pint and half of a sero-purulent fluid; the lung of the same side, reduced to nearly half its natural size and containing little air, was of a natural character throughout, except at its inferior and posterior margin, where there was a dark greenish spot of the size of a large bean (fêve de marais) exhaling the gangrenous fetor; it was soft, and very like the eschar

produced by caustic. It entered about six lines deep into the substance of the lungs, to which it adhered. The pulmonary tissue, to the distance of an inch around, was of the consistence of liver, and exhibited, when cut, a red and granulated surface.

Case 12. A man, aged 53, after being ill six weeks, came into hospital, affected with dyspnœa, frequent cough, with expectoration of very thick, opaque, yellow sputa, possessing (as did, also, still more so, his breath,) the fetor of gangrene. His debility had gradually augmented from the commencement of the disease; he was sallow and flaccid, but without any considerable emaciation. He died shortly after without any material alteration of symptoms. The following were the appearances on dissection: the left side of the chest contained much air, and also two or three pints of a black turbid serosity, both of which were extremely fetid. The lung was reduced to one fifth of its natural size, and contained in its upper lobe an irregular cavity, capable of holding a duck's egg, and filled with the same matter as was contained in the cavity of the pleura. The internal surface of this excavation exhibited no trace of the purulent membranous-like covering usually seen in ulcerous cavities of the lungs, but showed the pulmonary tissue quite bare, blackened, soft and easily torn. The main excavation communicated with several smaller ones, and, in the centre of each, there was a detached putrid mass of some consistence, evidently the remains of the gangrenous eschar. The superior lobe adhered to the pleura, and its substance was somewhat denser than natural. In every other part the pul-

monary tissue was blackish, soft, inelastic, and without any trace either of inflammation or tubercles. There were other diseased appearances in the chest, but none that seemed essentially connected with the particular disease in question.

Case 13. A man, aged 55, came into hospital affected with what was supposed to be a local affection of the nares. He had no pectoral symptom whatever, but a slight dry cough, which appeared to depend on the local disease; only towards the period of his death, the respiration became difficult and he complained of a sharp pain in the region of the larynx. The only diseased appearances, found on dissection, were the following: the inferior part of the left lung was slightly inflamed throughout, and contained, in its interior, a portion of the pulmonary tissue quite reduced to a thin putrid mass with the gangrenous fetor. This diseased mass was perfectly continuous with the surrounding tissue of the lung, which was merely red and engorged. The putrid mass was about the size of a large walnut, and completely filled its containing boundaries, so as to leave no sort of excavation, until after it was artificially discharged.

Case 14. A labourer, aged 42, subject for eighteen years to occasional pains in the chest, &c. began to have cough and very fetid expectoration in 1818, when he came into hospital. This patient died after remaining in the hospital for several months affected with violent pain of the chest, cough, and frequent purulent expectoration, often in great quantities. The following appearances were found

on dissection. The left side of the thorax was less than the right. When cut into, a great quantity of extremely fetid gas escaped. The lung adhered in many places to the pleura, and both these exhibited extensive recent depositions of coagulable lymph. The lung was much compressed. The cavity left by this compression was partly filled by a yellowish, semi-transparent fluid, having at its bottom a copious deposition of a puriform fluid, resembling that effused on the pleura, but softer. In the inferior border of the lung, there was found a small dark jagged opening, of the size of a goose-quill, which was evidently contained in the centre of a gangrenous eschar. This opening led to a cavity the size of a large walnut, about six lines deep in the lung. The walls of this cavity were very irregular, and lined by a dirty white membrane, covered with a puruloid fluid. Several bronchial tubes opened into it, and the whole was imbued with the strong gangrenous fetor. The tissue of the lungs was flaccid, fleshy, and contained little blood; its density was much greater, almost *hepatic*, to the extent of half an inch around the excavation. The bronchial tubes in the vicinity were much dilated.

Besides the idiopathic gangrene just described, there is one other circumscribed variety of this affection of the lungs, that, namely, which takes place in the boundaries of a tuberculous excavation. This is an extremely rare case;—at least ten times more rare than that we have been giving an account of. In this case the walls of the tuberculous cavity slough to the depth of one or two lines: this slough, when

softened down, is gradually expectorated; but the walls of the excavation continue for a long time thereafter to secrete a greyish sanious pus possessing the gangrenous fetor.

CHAP. IV.

OF HÆMOPTYSIS, OR PULMONARY APOPLEXY.

THE disease which I designate by the name of Pulmonary Apoplexy, though very frequent, is yet very little known in respect of its anatomical characters. It is, however, well known by its principal symptom, viz. hæmoptysis, or hæmorrhage from the lungs.

The antients attributed hæmoptysis to a rupture of some of the pulmonary vessels, and this is still the opinion of the vulgar, and also of many practitioners. Modern anatomists, however, have long been aware that this pretended cause of hæmoptysis is altogether false. Two varieties of this disease may, indeed, arise from such a cause; and these are, 1st, when an aneurism bursts into the bronchia or trachea, and 2ndly, when there is a rupture of a blood-vessel in a tuberculous excavation,—an event which I have already shewn to be extremely uncommon. These two species of hæmoptysis are followed by immediate, or almost immediate death, and can by no means explain the phenomena of a disease so common, and

often so slight, as hæmoptysis. Accordingly, hæmoptysis is now very generally considered as depending on some functional derangement of the bronchial membrane, which causes it to exhale blood in place of its ordinary mucous secretion. And this opinion is unquestionably correct as far as regards the slighter varieties of the disease, such, for instance, as occur in pulmonary catarrh, peripneumony, and in the earlier stages of phthisis.

Those cases, however, of violent and extreme hæmorrhage, which often resist all medical treatment, arise from a very different and more dangerous cause. In these, some part of the pulmonary substance has undergone great changes, being indurated to a degree equal to the completest hepatisation. The induration, however, is very different from the inflammatory affection of the lungs distinguished by this term. It is always partial, and never occupies a considerable portion of the lungs; its more ordinary extent being from one to four cubic inches. It is always very exactly circumscribed, the induration being as considerable at the very point of termination as in the centre. The pulmonary tissue around is quite sound and crepitous, and has no appearance whatever of that progressive induration found in the peripneumonic affection. The substance of the lung is, indeed, often very pale around the hæmoptysical induration; sometimes, however, it is rose-coloured, or even red, as if tinged with fresh blood; but, even in this case, the circumscription of the indurated part is equally distinct.

The indurated portion is of a very dark red, ex-

actly like that of a clot of venous blood. When cut into, the surface of the incisions is granulated as in a hepatised lung; but in their other characters, these two kinds of pulmonic induration are entirely different. In the second degree of hepatization, along with the red colour of the inflamed pulmonary tissue, we can perceive distinctly the dark pulmonary spots, the blood-vessels, and the fine cellular intersections, all of which together give to this morbid state the aspect of certain kinds of granite, as has been already observed. The same thing is observable in the third stage of peripneumony, and even when the infiltration of pus has converted the lungs into a yellowish mass. In the induration of hæmoptysis, on the contrary, the diseased part appears quite homogeneous, being altogether black, or of a very deep brown, and disclosing nothing of the natural texture of the part, except the bronchial tubes and the larger blood-vessels. The latter have even lost their natural colour, and are stained with blood.

In scraping the incised surfaces of these parts, we detach a small portion of very dark, half-congealed blood, but in a much less proportion than we can press out the bloody serum from a hepatised lung. The granulations on the incised surfaces have also appeared to me larger than in cases of hepatisation. Sometimes the centre of these indurated masses is soft and filled by a clot of pure blood.

This morbid affection is evidently produced by an effusion of blood into the parenchyma of the lungs, in other words, into the air cells. From its exact

resemblance to the effusion that takes glace in the brain in apoplexy, I have thought the name pulmonary apoplexy very applicable to it. The lungs and brain, however, are not the only organs in which a similar effusion may take place. I have seen such take place instantaneously in the subcutaneous cellular substance, and I have met with them, during dissection, in almost every part of the body,—between the intestinal tunics, among the muscular fibres of the heart, and under the cellular coverings of the pancreas and kidneys. In a case of fatal apoplexy I have found large effusions of blood in the cellular membrane of every limb, of the trunk, and in that surrounding most of the abdominal viscera. Some examples have occurred of sudden death from hæmoptysis, wherein the substance of the lungs was found lacerated, and containing clots of blood. Corvisart mentions one extraordinary case of this kind, in which the extravasation had lacerated the lung and filled the cavity of the pleura.*

The hæmoptysical engorgement above described, is only a lesser degree of the same affection, in which the effused blood, still, in some degree, under the influence of vital action, coagulates in the air cells in such a manner as to form an intimate union with the pulmonary tissue, very different from what would be produced by the mere physical coagulation of the blood. We sometimes find two or three similar indurations in the same lung, and frequently both lungs are affected at the same time. They take place most

* Nouvelle Methode, &c.

commonly in the central parts of the lower lobe, or towards the middle and posterior part of the lungs.

The hæmorrhagic induration of the lungs is as easily distinguishable from the congestions that take place after death, as from the alterations produced by peripneumony. The sanguineous congestions of the dead body consist of an accumulation of blood intermixed with serum, often spumous, which flows plentifully on an incision of the part, and tinges the lungs of a livid or vinous colour. Being the mere consequence of gravitation, the engorgement is found most considerable in the most depending parts of the lungs, and gradually lessens towards the superior parts. Where most engorged, the part still retains some crepitation, and the incised surfaces are never granulated, even when the congestion is so great as to destroy the spongy character of the lung. By washing, we can, in every case, remove all the blood, and restore the lung to that sort of flaccidity which it possesses when compressed by a pleuritic effusion. The engorgement of hæmoptysis, on the contrary, is accurately circumscribed, very dense, dark-red or brown, granulated, and almost dry when incised, and grows pale by washing, but without losing any part of its consistence.

Whatever may be the severity of this disease, resolution seems to take place with considerable facility, since we find a great many cases of cure after severe hæmoptysis. I have not had opportunities of tracing the progress of this resolution by morbid dissection; but I think it must often be quite complete,

since I have never been able to trace any vestige of the induration in subjects who had been affected with severe hæmorrhage at a period of some years anterior to their death.

The above condition of parts exists in every severe case of hæmoptysis; but, when the symptoms are moderate, and especially when the hæmorrhage is slight, the only morbid alteration of structure may be a reddening and thickening of the bronchial membrane, which, in this case, seems to secrete, as it were, or at least to permit, the transudation of the blood. The quantity of blood spit up is not of itself a sufficient indication of the nature of the organic lesion of the lung. The hæmoptysical induration or engorgement may be very extensive, while the expectoration of blood is inconsiderable,—for instance, only a wine-glassful in the 24 hours;—while a much larger quantity than this may be discharged by the mere change in the bronchial membrane.

The hæmorrhagic induration of the lungs may be, and often is, accompanied by the simple bronchial extravasation, as we almost always find the mucous membrane of the bronchia highly reddened and swollen, in those cases where the pulmonary engorgement exists in any extent. When this is very great and takes place very suddenly, the patient may be suffocated before any expectoration of blood has taken place.

The two following cases exhibit the disease in different degrees: the first, with a moderate local lesion, and slow course; the second, more severe and more rapid.

Case 15. A woman, between 50 and 60 years of age, came into hospital labouring under hæmoptysis, accompanied by great prostration of strength and emaciation, great dyspnœa, and general anasarca. No account of her previous state could be obtained. She died in the course of a few weeks thereafter, continuing to spit up blood to the last. On examination after death there were found marks of inflammation in the pleura, and considerable disease of the heart. The state of the lungs shall only be here noticed. The left lung contained here and there in its substance, portions of a reddish-brown colour, firm, granular when incised, exactly circumscribed, and surrounded by parts perfectly crepitous. These indurated portions were not at all like those of peripneumony, but seemed to be the consequence of a peculiar combination of the blood (strongly coagulated and *dried*) with the pulmonary tissue. In the inferior lobe there was a similar mass, more than a cubic inch in extent, formed by three concentric layers, separated from each other by thinner layers of a tissue still retaining its original soft and crepitous character, but only much redder than natural. The larger layers (obviously the product of effused blood) were of a dark red, granular when incised, very firm, fragile, and so dry that it was with difficulty that even a small portion of clotted blood could be expressed from them. One of these layers was so soft in one point as to resemble a clot of blood. The portions of lung thus indurated yielded, when cut into, no humidity, unless when pressed or scraped; while the other parts of the lungs were more than ordinarily

imbued with a yellowish frothy serum, which escaped from them when incised. There were a few tubercles. In the right lung there was one morbid spot like those in the left. The mucous membrane of the bronchia was of a deep red colour, in different points, in both lungs.

Case 16. A man, aged 45 years, who had been affected for six months with a disease of the heart (hypertrophia) similar to that alluded to in the last case, accompanied with much dyspnœa occasionally, and also partial œdema, came into hospital, for the third time, in January 1819, affected with an aggravation of the same symptoms, viz.—great dyspnœa, pain of præcordia, cough, diarrhœa, &c. A fortnight after, subsequently to an aggravation of the dyspnœa, he discharged, almost without effort or cough, a large quantity of red frothy blood: he died four days after. The right lung, to the extent of three fourths of its volume superiorly, was reddened, rather than infiltrated, by blood of very bright colour, its tissue being, in other respects, quite crepitous, and rather dry than otherwise. Towards the base there was a zone or band (of the width of two or three fingers, and occupying the whole thickness of the lung), of a consistence equal to that of liver, of a reddish-black colour, and exhibiting the granular surface when cut into. This zone was exactly circumscribed, and united immediately to the sound and crepitous tissue without any gradation. There were three or four portions of the same kind, and equally circumscribed, in the superior part of the same lung, but of a size scarcely equal to an almond or walnut. The largest

of these was divided, in a part of its inferior border, from the sound tissue of the organ, by a fine membrane, which was evidently one of the natural intersections of the viscus. The left lung contained, in the posterior part of its lower lobe, two or three engorgements of the same kind, and equally circumscribed. In both lungs the bronchial tubes were somewhat dilated, and filled with an opaque grey mucus. The lining membrane of the trachea was redder than natural, and that of the bronchia, in many places, particularly in the smaller ramifications, was notably thickened and of a violet red colour.

CHAP. V.

OF PULMONARY CATARRH, OR BRONCHITIS.

SECTION FIRST.

Of the Acute Pulmonary Catarrh.

PULMONARY CATARRH is unquestionably one of the most frequent of diseases, insomuch that most persons are affected with it, in some degree or other, almost every year. Notwithstanding this frequency, it is perhaps less understood than many rarer diseases. In most cases it occurs in so slight a degree as scarcely to derange, in any respect, the functions

of the body, or to prevent the individual from following his usual occupations; occasionally, however, it is of sufficient violence to endanger life.

Pulmonary catarrh is inflammation of the mucous membrane of the bronchia. A greater or less redness, and a certain degree of thickening of the membrane, are the only anatomical characters of this affection; and even these sometimes disappear after death. In the case of an old man who died of this disease, I found these appearances much less distinct than in the body of a woman who had died the same day of fever, during the course of which she had coughed very little.

This inflammation is attended, from the commencement, with a secretion of mucus more abundant than natural, and possessing characters which vary in the different stages of the disease. At first it is thin, transparent, and somewhat acrid or saltish to the taste; it becomes gradually thicker, more viscid, and less transparent; and, towards the close of the disease, it grows quite opaque, and assumes a whitish, yellow, or slightly green colour. In this state it obstructs, more or less completely, the bronchial tubes, especially those of a small calibre; and the impeded transmission of air, in consequence of this, produces the sound usually denominated *the rattles.*

The inflammation which constitutes pulmonary catarrh very rarely occupies the whole bronchial membrane, even of one lung. When the contrary is the case, the disease is very severe, and accompanied by a violent fever. Commonly, in the severest catarrhs even when there are much fever and expec-

toration, there is only inflammation of some portions of the membrane, either in both lungs or only in one. In slighter catarrh, unattended by any perceptible fever, the whole seat of the disease does not extend beyond a small part of a single lung.

The only difference between this disease and croup, is, that, in the latter, the mucus secreted is coagulated so as to resemble the false membranes produced by the inflammation of serous membranes. This variety of the pulmonary catarrh is strongly marked, as well by its symptoms as by its pathological character; yet there are many other intermediate shades, in which the chief symptoms are only change of the voice, extreme dyspnœa, and the secretion of a mucus very tenacious and difficult of expectoration. It is especially in the catarrhal affections of children that we can trace all the gradations of this disease, from the mere pulmonary catarrh with an expectoration quite liquid, to the severest croup, in which the false membrane is of the firmest consistence, and lines the bronchia to their extreme ramifications.

There is nothing peculiar or characteristic in the cough attending acute catarrh. In the commencement of the disease it is hard, painful, and accompanied by much irritation; and the sputa are watery, transparent, slightly frothy, and nearly colourless, and seem to be entirely composed of an intermixture of saliva and the mucus of the mouth and throat. Sometimes, especially when the cough is neither severe nor frequent, the expectoration is very little, and consists for the most part of the grey, glutinous, semi-transparent matter, intermixed with

dark or grey opaque spots, which usually goes by the name of *bronchial mucus.*

In this stage, the expectorated matter is very different from the viscid, adherent, and united sputa of peripneumony, but differs in no respect from that which attends pleurisy or the early stage of phthisis. In a later stage of catarrh, this thin and transparent fluid becomes intermixed, in small quantity, with sputa of a whitish, yellowish, or greenish colour, and opaque. Still later, the thin fluid disappears entirely, being replaced by a copious formation of this opaque mucous expectoration, which, notwithstanding its consistence, is commonly intermixed with bubbles of air. This kind of sputa is also very distinguishable from that of peripneumony, especially in the first and middle stages of that disease; but very frequently there is no difference between it and the expectoration in the last stage of peripneumony, or in a pleurisy which terminates by resolution, or indeed from that of the greater number of phthisical patients.

SECTION SECOND.

Of the Chronic Pulmonary Catarrh.

The chronic, like the acute catarrh, has a great variety of symptoms; they may all, however, be reduced under two principal species, viz.—the *humid* and the *dry;* the former being attended by copious expectoration, the latter with scarcely any expecto-

ration. The humid species may be further divided into two varieties, viz: *mucous catarrh*, or with opaque and yellow sputa; and *pituitous catarrh*, or with transparent, colourless, ropy sputa, exactly like the white of egg diluted with water.

The mucous catarrh is often the habitual infirmity of the aged. I have seen it, also, exist for twenty years in persons of middle age; but this is very rare in adults. Most commonly the mucous chronic catarrh has succeeded a severe attack of the acute, the fever which attended the latter having gone off, or, at least, become very slight and irregular, without any diminution of the cough or expectoration. After this change to the chronic state, the sputa continue copious, and retain nearly the same character as in the latter stage of the acute disease. Sometimes, however, they become more opaque, slightly greyish, and more puriform, and are in every respect like those of phthisis. In this state the expectoration is in general easy, and the cough neither frequent nor fatiguing.

Sometimes this disease, after lasting several months, or even a year or two, gradually disappears without leaving behind any trace of it; at other times, it changes into the *dry* species, to be noticed directly; and occasionally, though rarely, it proves fatal, after having exhibited all the symptoms of consumption, so strongly marked as to render the real character of the disease unknown until after death.

When chronic catarrh has become habitual, and is attended by much dyspnœa, it constitutes one of the diseases usually confounded under the general name

of asthma. In a nosological system, founded, like that of Sauvages, on the character of the symptoms, this affection might be named *Asthma a nimia respiratione.* This is one of the least troublesome kinds of asthma; it is rarely marked by any paroxysms, and remains usually in the same degree of intensity, unless when aggravated by an increase of the catarrhal symptoms, or an attack of some other disease of the chest. This variety of chronic catarrh is chiefly met with in old persons, and in delicate and nervous habits. When, in the former, the progress of years, or any other cause has greatly weakened the individual, the power of expectoration is lost, and the *rattle* on the lungs, and finally in the trachea, becomes very great, and constitutes the *suffocating catarrh* of practical medicine.

The *pituitous catarrh* is usually attended by a much stronger, harder, and sharper cough, than the foregoing species. The cough comes in paroxysms, and is often followed by nausea, which seems to facilitate the expectoration of the pituitous matter. There is often not very much dyspnœa. This variety of catarrh is commonly met with among the aged,—in incipient consumption, and, also, in cases where the cicatrization of tuberculous excavations has been followed by the formation of cretaceous productions, or a great accumulation of the *black matter,* in the lungs.

The *dry chronic catarrh* is that which we shall describe more particularly under Emphysema of the lungs. It generally succeeds to an acute catarrh, after the cessation of the expectoration of the latter

stage, and is sometimes attended by much irritation; at other times it is very little felt. Occasionally this variety of cough makes its appearance without being preceded by the acute catarrh. In this case it is commonly called *nervous;* and too often, considering it as sympathetic, we search for its cause in other, and sometimes distant, organs—as, for instance, the stomach, the liver, the kidneys, and even the uterus.

I do not wish here to deny the existence of sympathetic coughs, much less the reciprocal influence of affections of the lungs and liver, when these exist simultaneously; but I am certainly of opinion that our imperfect knowledge of the anatomical characters of the diseases of those organs, has given a degree of importance to many supposed sympathies which these little merited.

The dry catarrh ceases sometimes spontaneously, but it readily becomes habitual, and the more so the less violent it had originally been; indeed it is chiefly from the infrequency and decreased violence of the cough, joined to the slight degree of oppression, that we are led to suspect its continuance. This slight oppression becomes gradually more considerable, and often augments in proportion to the decreasing frequency of the cough. This is often so slight as to be insensible to the patient, and, indeed, may not at all recur for several days. The expectoration consists of small portions of greyish semitransparent mucus, or, occasionally, a few very adhesive specks of the yellow opaque sputa.

After a time, symptoms of emphysema of the

lungs supervene to the preceding. Sometimes the cough ceases entirely during the summer, and, in this case, the oppression on the chest becomes less,—no doubt because the augmentation of the cutaneous discharge lessens the mucous secretions of the bronchia. When a person habitually subject to the *dry* catarrh, has an attack of acute catarrh, the oppression on the chest is generally at first augmented; but this lessens on the supervention of expectoration, and indeed becomes much less than before the attack of the recent disease. This effect appears to me to be accounted for by the increased liquidity, and consequent easier expectoration, of the bronchial mucus during the prevalence of the acute catarrh.

Before terminating this chapter, it may be useful to make a few observations on one symptom which many nosologists have erected into a distinct disease—I mean *Asthma*. This word, which properly signifies difficulty of breathing, has been as much misused, and has been made the cognomen of as many different diseases as any word in medicine. It has been proved by Corvisart that a great part of the diseases usually so denominated, are, in fact, diseases of the heart and large vessels; and every person accustomed to morbid dissection is now aware that the cases denominated *humid* or *humoral* asthma, are simply examples of chronic catarrh. The extended use of the stethoscope will, I doubt not, further enable us to trace many cases of this disease now considered as nervous, to particular organic lesions now little known. Of this number is emphysema of the lungs, as I shall show hereafter; an

affection which I am more and more led to consider as constituting one of the most common species of asthma.

I do not mean, however, to deny that there may be asthmas, or, to speak more exactly, dyspnœas, purely nervous, or unattended by any organic lesion of the parts concerned in respiration. Indeed, we meet with cases in practice, where there is neither obstruction to the air from organic disease, nor accumulated sputa, and where, nevertheless, the breathing is habitually difficult and oppressed.

Under the same head of purely nervous, may perhaps be ranged the *spasmodic asthma*, when this is well characterised by an evening paroxysm, and a morning remission, after a slight expectoration. I must confess, however, that I have even doubts on this case. Characterised by the regularity of paroxysm mentioned, it is an extremely rare disease; and when irregular in its recurrence, it differs in nothing from a case of emphysema of the lungs.

CHAP. VI.

OF DILATATION OF THE BRONCHIA.

The organic lesion which I am now to notice, seems to have been hitherto entirely overlooked, both by the anatomist and the practitioner. This oversight is easily accounted for by the circumstance

that, as it generally occurs in a small portion of a bronchial tube, when observed, it has been mistaken for a larger branch. It can only be detected by tracing the individual bronchial tubes to their ultimate ramifications,—a thing which is rarely done in our examination of the lungs.

This species of dilatation is generally met with only in subjects that have died, after being affected by chronic catarrh. It is sometimes so considerable, that the bronchial ramifications, which, in their natural condition, would scarcely admit the point of a very fine probe, acquire the diameter of a goose-quill, or even of the finger. These dilated portions terminate in culs-de-sac capable of containing a hemp-seed, a cherry-stone, a filbert, or even an almond. The mucous membrane of these is commonly of a red or violet colour, and is evidently thickened. The cartilaginous circles seem to be converted into a fibrous tissue, and are so closely united with the mucous coat as not to be separable by dissection.

This affection may exist in any part of the lungs, but is most common in the superior lobe. Ordinarily it exists in only a small number of the ramifications of the bronchia; sometimes, however, it extends to all the branches of one of the lobes. In this case, the dilatation is always greater (not relatively merely, but absolutely) in the smaller than in the larger ramifications, and greater in these latter than in the trunks whence they originate. The common trunks are rarely dilated, in any perceptible degree, even in the cases where some of their branches emulate them in diameter. When the dilatation of the bron-

chia is so great as this, the intermediate substance of the lung is flabby, void of air, evidently compressed, and, in short, resembling, in every respect, the same substance when compressed towards the spine, by an effusion of serous or purulent fluid into the cavity of the pleura.

This affection of the bronchia is always produced by chronic catarrh, or by some other disease attended by long, violent, and often repeated fits of coughing. The hooping-cough, for this reason, is the most frequent cause of all.

When the dilatation is confined to one or two of the bronchia, it produces no other inconvenience but an habitual cough, not very frequent nor severe, and a moderate degree of mucous expectoration; but when a great number of the bronchia are dilated, through their whole ramifications, the result is a chronic catarrh which lasts for life, and which, indeed, may sometimes shorten its duration, through means of the exhaustion produced by the dyspnœa, the severe and long-continued fits of coughing, and, more especially, by the abundance of the expectorated sputa, which are of a greyish-yellow colour and altogether puriform. Sometimes, however, patients affected with all these symptoms, and the degree of infirmity the necessary consequence of these, live to an advanced age.

I shall conclude this short account of this rare organic lesion, by a brief detail of two cases of it furnished me by M. Cayol.

Case 17. A child, three and half years old, had been affected with cough for three months, after an

attack of hooping cough. The cough came on in paroxysms after intervals of several hours, and was followed by an abundant expectoration of a yellow puriform matter, excessively fetid, like that from a carious bone. It was sometimes intermixed with mucus. It was evacuated not in the usual manner of sputa, but rather in mouthfuls, which continued to flow for some time, from the child's mouth, after the fits of coughing, which were violent and painful, and attended by redness of the face. In the intervals of the cough there was no pain, and the child slept well, and it looked fresh and plump. The child gradually got worse, and died after a fortnight, having previously become feverish, anasarcous, and affected with diarrhœa. On examining the lungs after death, the only material organic alteration found in them, was in the inferior lobe of the left side, the bronchial ramifications of which were found dilated in the manner already detailed, and containing more or less of the same purulent fluid expectorated during the life of the child. Upon laying open these bronchial tubes through their whole length, it was found that each of them, at the distance of about half an inch after entering the substance of the lung, began to be dilated, and progressively augmented in diameter until it finally terminated in a large cul-de-sac, at the distance of a line or two from the surface of the lung. Towards their termination most of these tubes would have admitted the little finger, and others would only have received an ordinary sized quill. During their course they gave off several branches which ended in similar culs-de-sac,

after running two inches or more. The mucous membrane of these dilated tubes was, throughout, of a deep red or livid colour, thinner than natural, but without any breach of continuity, and was evidently the secreting source of the purulent matter contained in it.

Case 18. A woman, 62 years of age, had been affected, ever since she was sixteen, with a disease of the chest, which exhibited most of the usual symptoms of consumption. The principal of these were—hæmoptysis, very frequent, and renewed by the slightest causes; constant cough, with expectoration of opaque, yellow sputa, having sometimes the character of pus, sometimes of a puriform mucus; and respiration more or less impeded. These symptoms varied much; they had very marked remissions, but scarcely ever any positive intermission: they never prevented her from following her occupation of teaching the piano-forte. Her chest was well formed, and she had nothing of the consumptive configuration. Without any material aggravation of the pectoral affection, this woman became universally anasarcous, and died shortly after entering the hospital.

On examining the body after death, we could discover, in pressing the body of the lungs, which were soft and flabby, various hardened portions of different sizes, especially in the superior lobe. Upon cutting into the lungs, these proved to be the hardened coats of various of the bronchial tubes dilated in the manner of the former case. Indeed they agreed in almost every respect with these. The largest of

them would have contained the end of the thumb; some were empty, and others contained a yellow purulent matter like that expectorated by the patient. They ramified in the manner detailed in the preceding case. The natural tunics of the dilated portions seemed all converted into a single one, much harder and more polished than the natural coats of the bronchia, and intimately connected with the tissue of the lungs. There was not the slightest mark of ulceration in any part of the inner coat, so that the pus contained in these cavities must have been evidently secreted or exhaled by it. The greater portion of the bronchial tubes in the superior lobe was in this condition, some of them being dilated to a size seven or eight times greater than natural. All the cavities taken together might probably occupy three fourth parts of the lobe. Some of them were divided merely by very thin bands of the pulmonary tissue, compressed into the appearance of a membrane. In some of the other lobes there were a few bronchia similarly dilated, but in a lesser degree. The mucous membrane of the trachea and larynx was sound.

CHAP. VII.

OF EMPHYSEMA OF THE LUNGS.

The disease which I designate by this title is very little known, and has not hitherto been correctly de-

scribed by any author. I for a long time thought it very uncommon, because I had observed only a few cases of it; but since I have made use of the stethoscope, I have verified its existence as well on the living as the dead subject, and am led to consider it as by no means infrequent. I consider many cases of asthma, usually deemed nervous, as depending on this cause. The chief reason of this affection having been so completely overlooked is, that it is in some sort merely the *exaggeration* of the natural condition of the viscus.

In order that we may have a clear idea of the disease in question, it may be useful to advert to the natural organization of the pulmonary tissue. In examining, in a good light, the surface of the healthy lung, we can perceive, even with the naked eye, through the transparent pleura, which forms its covering, that the parenchyma of the viscus consists of an aggregation of small vesicles, irregularly spheroid or ovoid, filled with air, and separated from each other by opaque white partitions. These vesicles,—which, as seen on the surface of the lung, have the appearance of small transparent points,—are not all of one size. The largest are one third or one fourth part the size of a millet-seed. These are grouped in masses or lobules, which are circumscribed by partitions of condensed cellular substance, very thin, but yet thicker and more opaque than the partitions which separate the individual air cells. These larger partitions traverse the lungs in all directions, and, consequently, in cutting each other at every possible angle, form, on the surface, figures of

very various shapes—lozenges, squares, triangles, &c. It is along these partitions that the black pulmonary matter, of which we have already spoken, is most plentifully deposited.

In emphysema of the lungs, the size of the vesicles is much increased, and is less uniform. The greater number equal, or exceed the size of millet-seed, while some attain the magnitude of hemp-seed, cherry-stones, or even french beans (haricot). These latter are probably produced by the reunion of several of the air cells through rupture of the intermediate partitions; sometimes, however, they appear to arise from the simple enlargement of a single vesicle. The largest of these dilated cells are often in no respect prominent on the surface of the lung; sometimes they form a slight projection. In the latter case the structure of the lung acquires a striking resemblance to the vesicular lungs of the Linnæan order of Reptilia. Sometimes, though more rarely, we observe on the surface of the lung single vesicles, distended to the size of a cherry-stone or larger, quite prominent, exactly globular, and apparently pediculated. I say *apparently* pediculated, because on cutting into them we find that there is no real pedicle, but merely a constriction at the point where the cell begins to rise beyond the surface of the lung. The cavity of these dilated cells descends some little way into the substance of the viscus, and there its walls do not collapse, when cut, as in the projecting portion. At the bottom of this inferior portion of the cavity, we find small openings by which the dilated cell communicates with the adjoining ones,

and with the bronchia. That these projecting vesicles are produced by the dilatation of an air cell, and are not owing to the extravasation of air under the pleura, is proved, as well by the prolongation, just mentioned, of their cavity into the pulmonary substance, as by the circumstance that we cannot force the contained air, by pressure with the finger, to leave its place and to pass under the contiguous pleura,—as would be the case if it were extravasated.

As long as the parts continue in the state above described, the disease consists merely in an excessive, permanent, and unnatural distension of the air cells, the air being still contained in its proper cavities; but when the distension becomes still more considerable, or takes place with greater rapidity, the air cells are ruptured in certain points, and the surrounding cellular substance of the lung becomes distended by extravasated air, exactly in the same manner as in emphysema of the subcutaneous adipose membrane. In this case we find on the surface of the lung vesicles of an irregular form, which can be made to change their place by pressure with the finger. They vary in size from that of a hemp-seed to that of a walnut, or even an egg. Like the simply dilated cells, these vesicles contain nothing but air, which makes its escape on their being punctured with a pin. Sometimes the air, though truly *extravasated* under the pleura, cannot be displaced by pressure in the manner just mentioned. This happens when the extravasation is situated at the point of reunion of the partitions which divide the different groupes of air cells, as above mentioned. In this

case the projection has usually a triangular shape and is not very considerable.

I have never found this extravasated air penetrate, to any considerable extent, into the substance of these interlobular partitions, nor into the cellular substance which surrounds the larger blood-vessels and bronchial trunks; but I have seen the pulmonary substance in the interior of the lung lacerated by over-distension of the air cells. These lacerated portions contain air, and sometimes also a small quantity of blood, either coagulated or loose; and the surrounding air cells, which form the immediate walls of the excavation produced by the rupture, are observed to be loose, flabby, and without their natural globular figure.

The bronchial tubes, especially those of a small caliber, are sometimes very evidently dilated in those portions of the lung where the emphysema exists. This is easily proved by comparing the diseased and sound portions of the lungs. It is a thing to be expected; and it is, indeed, singular that it is not more common, since the cause which dilates the air cells must act equally on the bronchia: it is, notwithstanding, very rare.

Emphysema may affect both lungs at the same time, one only, or a part of one or of both. In the latter case,—and indeed in any case, as long as there do not exist vesicles of considerable size on the superficies of the lungs,—it is easy to overlook the disease in the dead subject, and, as I have already said, I am convinced that this has often been done, not only by myself but by the best practical anatomists.

For my own part I am convinced, that if we carefully examine the lungs of subjects who have long suffered from dyspnœa, from whatever cause, we shall almost always find more or fewer of the air cells dilated. In lungs studded with tubercles, which presented no other symptom of emphysema, I have sometimes found two or three of the cells dilated to the size of a hemp-seed.

When the disease exists in a high degree, and occupies the whole of one or both lungs, one cannot help being struck with the appearance of the parts. The lungs seem as if confined in their natural cavity, and, when exposed, instead of collapsing as usual, they rise in some degree and project beyond the borders of the thorax. If we examine them in this state they feel firmer than natural, and it is more than usually difficult to flatten them. The crepitation they afford on pressure, or on being cut into, is less, and of a kind somewhat different; it is more like the sound produced by the slow escape of air from a pair of bellows; and the air makes its escape from the cells much quicker than in a healthy state of the organ. When we detach the lung, the crepitation is found to be still less perceptible, and the sensation conveyed by pressing the parts is very like that produced by handling a pillow of down. On placing an emphysematous lung into a vessel of water it sinks much less than a healthy lung; sometimes it floats on the surface with scarcely any obvious immersion. The pulmonary tissue is drier in a lung affected with emphysema, than in a healthy one; and it is unusual to find, even towards the root of the lungs,

any trace of the common serous or sanguineous engorgements usually found after death. The contrary, however, is sometimes the case. When a single lung is affected, it becomes much more voluminous than that of the other side, so much so, indeed, as sometimes to press on one side the heart and mediastinum, and to cause an evident enlargement of the bony compages of that side of the chest.

From these observations it results, that Emphysema of the lungs consists essentially in the dilatation of the air cells, and that the *extravasation* of the air on the surface of the lungs, constituting the larger and more prominent vesicles, is a posterior affection, and not necessarily connected with the disease in question. The latter species of lesion is, moreover, one of slight consequence compared with the dilatation of the cells, as we can hope for its removal by absorption, as in other similar cases; whilst we can hardly conceive in what manner either nature or art can remedy the other morbid derangement.

The disease, the morbid anatomy of which has just been described, appears to me, as I have already observed, to have been hitherto unknown. No general description of it certainly exists; although facts, that evidently can be only referred to it, are to be found in several authors. Bonetus and Morgagni give several examples of the lungs being found very voluminous and distended with air. Van Swieten and Stork have some cases wherein vesicles of air were found under the pleura; and Floyer noticed the same thing in a broken-winded mare. The author of the article *Emphysème,* in the Dict. des

Sciences Med. relates a case precisely similar to these last mentioned, which had been communicated to him by M. Majendie; but none of these various authors appears to have been acquainted with the real character of the affection, viz.—dilatation of the bronchial cells. All of them seem to have thought, with the last mentioned writer, who expresses his opinion in a positive manner, that the derangement in question consisted in the infiltration of the cellular substance of the lung with air. Ruysch and Valsalva are the only authors, as far as I know, who have observed, in individual cases, the dilatation of the cells. The case noticed by the latter is an example of partial emphysema of the lungs complicated with empyema. It has been noticed by Morgagni, under its latter character, who does not appear to have understood the nature of the former change of structure. This, however, he has described in a manner to leave no doubt of its true nature. "Sinistri pulmonis lobus superior..... quâ claviculam spectabat, vesiculas ex quibus constat mirum in modum auctas habebat; ut nonnullæ avellanæ magnitudinem æquarent; cæteræ multo minores erant. Quædam globuli figurâ, reliquæ oblongâ et ovali: omnes plenæ erant aeris.... una insuper minima quædam foraminula per interiorem faciem hiantia ostendit." *

The case noticed by Ruysh is also one of partial emphysema of the lungs: "In aliquâ autem pulmonis parte inveni vesicularum pellucidarum acervum, ab aere expansarum et ita obstructarum ut levi compressione eas ab aere evacuare haud potuerim. Im-

* De Sed. et Caus. Morb., lib. II. epist. 22, nos. 12 et 13.

pulsum per asperam arteriam flatum nullum commercium cum hisce expansis vesiculis ampliús habere propter earum obstructionem expertus sum. Post, aere per asperam arteriam vehementer adacto disrumpebantur nonnullæ ex his vesiculis."* This author has perhaps a second case of the same kind (OBS. 20), but it is too imperfectly described to justify any deductions from it.

Dr. Baillie, author of the Morbid Anatomy, has correctly observed the three principal circumstances which constitute emphysema of the lungs, namely—the great size of these organs,—the dilatation of the cells,—and the vesicles formed by the extravasation of air under the pleura; but he does not appear to have been acquainted with the mutual dependance of these three states, and describes them as three different affections, as is evident from the following passages, which contain all that he says on this subject.

"*Lungs distended with air.* In opening into the chest, it is not unusual to find that the lungs do not collapse, but that they fill up the cavity completely on each side of the heart. When examined, their cells appear full of air, so that a prodigious number of small white vesicles are seen upon the surface of the lungs immediately under the pleura. The branches of the trachea are often at the same time a good deal filled with the mucous fluid. This fluid had probably prevented the ready egress of the air, so that it had gradually distended the air cells of the lungs, and had prevented the lungs from collapsing."

* RUISH, Obs. anat. centur., obs. XIX.

"*Air Cells of the Lungs enlarged.* The lungs are sometimes, although I believe very rarely, formed into pretty large cells, so as to resemble somewhat the lungs of an amphibious animal. Of this I have now seen three instances. The enlargement of the cells cannot well be supposed to arise from any other cause, than the air being not allowed the common free egress from the lungs, and therefore accumulating in them. It is not improbable also, that this accumulation may sometimes break down two or three contiguous cells into one, and thereby form a cell of a very large size."

"*Air Vesicles attached to the edge of the Lungs.* Vesicles containing air have occasionally been seen attached to the edge of the lungs. They do not communicate, however, with the structure of this organ, but are complete in themselves. Upon the first view, it might be thought probable that they were merely some of the air cells enlarged; but as they do not communicate with any of the air cells, this opinion is not well founded. It is most likely that they are a morbid structure, formed in the same manner as the air vesicles attached to the intestines and mesentery of some quadrupeds, and that the very minute blood vessels which ramify upon the vesicles, have the power of secreting the air.*"

These observations I wish to confine to the emphysema from internal causes, without at all including the disease mentioned by surgical writers under this name, produced by the introduction of foreign bodies into the trachea, and which disease

* Morbid Anat. Chap. III.

they describe as consisting in an extravasation of air into the cellular substance interposed between the air cells. It is indeed true that such an accident, as well as violent exertions of the lungs, as in child-birth &c., can and do sometimes produce emphysema of the neck, chest, &c.; but such an affection can only arise from rupture of the bronchial tubes or air cells: and I am disposed to believe that in no such case is there any actual penetration, by the extravasated air, of the interlobular cellular substance of the lungs themselves.

The following cases afford examples of most of the facts noticed in this chapter.

Case 19. A woman, aged 50, came into hospital affected with great dyspnœa and cough, which were said to have existed three weeks. She died the same night. The right auricle of the heart was found much enlarged and distended with blood; and a great part of the right lung, and almost all the inferior lobe of the left, were affected with emphysema, such as described in the preceding pages.

Case 20. A woman had been subject to frequent and severe catarrhal affections from infancy, one of which, in her twenty-eighth year, was followed by nocturnal paroxysms of dyspnœa, which, together with cough, continued and became more frequent, so as to attack her in the day time. When admitted into the hospital, in her forty-first year, she laboured under an aggravation of the same symptoms, to which had been recently superadded frequent palpitations and very general anasarca. She died shortly after her entrance. The whole of the right lung was

emphysematous, and exhibited on its surface vesicles full of air, of the size of a small pigeon's egg. The left lung was partially affected in the same manner. There was *hypertrophia* of the heart.

Case 21. A man had been affected from infancy with an habitual cough, mucous expectoration and dyspnœa, which were always so much augmented in winter as to confine him, for several days, to bed. In his thirty-seventh year, on the supervention of anasarca of the abdomen and lower extremities, he came into hospital. At this time there was much dyspnœa, with livid lips, cough, very severe and sonorous, accompanied by copious expectoration of colourless, ropy and frothy sputa. Percussion of the chest produced a distinct sound, but the murmur of respiration (see Part II) was almost extinct over the whole chest. These symptoms continued with much variation of intensity, and after leaving the hospital twice, he returned and died in it the same year.

The whole of both lungs were found emphysematous, as described in the present chapter, and there were vesicles of *extravasated* air under the pleura. There was no other disease of these organs, nor of any other, except the heart, which was enlarged to twice its natural size.

Case 22. A man, of delicate health in childhood, and affected with spinal curvature, in his twenty-eighth year became subject to slight cough and habitual dyspnœa. Two years afterwards he caught a severe cold, with much aggravation of his former symptoms, and came into hospital in January. At

this time there was much dyspnœa and severe fits of cough, with mucous expectoration; inability to lie in the horizontal posture, and lividity of cheeks, lips and nails. On percussion the chest was sonorous, but the respiratory murmur was not perceptible in the greater part of it. This man died in two days. The whole of the left lung was affected with emphysema, but was in other respects quite healthy. The bronchial tubes appeared to be dilated; they were very red internally and filled with a white ropy mucus. The upper and middle lobes of the right lung were in the same emphysematous condition; but in the inferior lobe a portion of the tissue was in the state characteristick of inflammation, as described in the chapter on peripneumony. One portion was hepatised.

Case 23. A woman, aged 52, had been affected for the last eighteen years with dyspnœa, habitual cough, attended with little expectoration, but often so severe as to prevent sleep. She had never been prevented from following her occupation until the period of her entry into hospital. At this time there was considerable emaciation, complete incapacity to lie in the horizontal posture, respiration short and difficult, very frequent and severe cough, of a convulsive character like that of the hooping-cough, and mucous expectoration, the pulse quick, and skin of the natural temperature. The chest sounded well on percussion, but respiration was inaudible in the greater part of it: pectoriloquism was very distinct above the right clavicle. This woman died three days after her admission.

Both lungs were found adhering strongly to the ribs by old attachments. The whole of the left lung was emphysematous, the air cells in many places being very prominent on the surface and large. In several places on the surface of the lungs there were four or five marks of an irregular oval form, and of the size of an almond. These marks corresponded to excavations situated two or three lines deep in the lung, which were produced by laceration of its substance. These cavities,—of which the largest might have contained a middling-sized walnut, and the smallest a filbert,—were full of air, and collapsed on being cut into. The internal surface of two of these was tinged with blood, and one of them contained a small clot of blood, one fourth of its own size. The walls of the others were of the natural colour of the lung, and presented a layer of ruptured and compressed cells to the depth of a line and half. Beyond this depth, on all sides, the cells were distended beyond the natural size. It is to be remarked that the ruptured portions did not exist in any place at a greater depth under the surface than an inch, and that, below this, the emphysematous dilatation of the cells was not very distinguishable. It was equally evident that the cells in the vicinity of these lacerations were neither larger nor more numerous than elsewhere, and that there was no infiltration or extravasation of air into the inter-alveolar tissue. The right lung exhibited, but in a lesser degree, the same dilatation of the cells, but no rupture of substance. In the upper and posterior part of this lung, however, there was found an excavation of an oval

shape, about two inches in length, fifteen lines broad in its centre, and two lines deep. The inner surface of this cavity was smooth and polished, though somewhat irregular; it was white, but interspersed with red specks arising from numerous small vessels. It contained some small fragments of an opaque, very dry, semi-friable matter, of a pale ochre yellow colour, and attached to the walls of the cyst. Three bronchial tubes, of the size of a goose-quill, terminated with open mouths in this cavity. Their coats were continuous with its walls, and their communication with their trunks was quite free. In detaching the lungs from the pleura costalis, this cyst was ruptured, so that one portion remained adherent to the side. It was of very unequal thickness, the part just mentioned being about two lines, while that imbedded in the lung was from three to seven or eight lines thick. Its substance was of a white brilliant hue, slightly semi-transparent, and of a texture entirely similar to that of the intervertebral cartilages, only, perhaps, with a superior degree of density. It was entirely empty. At the lower and middle part of this cyst, where its walls were thickened, it gave off, in different directions, four or five bands (of an irregular thickness, and an inch in length), of the same cartilaginous structure. The pulmonary substance interposed between these bands (to which, as well as to the cyst, it was intimately adherent), was flaccid, compressed, and of a greyish colour, but, in other respects, quite sound. In different parts of the same lung there were a few small rounded cysts, of the size of hemp-seed or cherry-stones, containing

a dry cretaceous fatty matter, which seemed intermediate between chalk and the matter of tubercles. These cysts were of an equable thickness, of a line or a line and half, greyish, semi-transparent, and of a semi-cartilaginous texture. The heart was slightly diseased; the other viscera were sound.

The four cases, of which I have now given a brief outline, exhibit emphysema of the lungs in its different degrees. The last case gives, further, an example of a cure of what is usually called an ulcer of the lungs (see Chap. i.). It even exhibits both the modes in which this cure can be effected, viz: by cicatrization and fistula; as we must regard the great thickness of some part of the cyst, and the cartilaginous bands connected with it, as the consequence of that superabundance of the cartilaginous formation which we have seen occasionally take place in such cases.

It may be questioned what was the nature of the matter originally contained in this cavity, and of which I have noticed a few dried fragments as still remaining. Most probably it was a mixture of chalky and tuberculous matter. Whatever it may have been, I am disposed to consider it as being *dead* matter. In explanation of this term I may observe that I agree with M. Bayle, in believing that such extraneous productions as tubercles, cancers, &c. do certainly possess vitality, but with a duration and laws different from those of the natural tissues of the animal economy.

In their origin these productions are of a firm consistence; they are nourished by blood vessels, or,

at least, by lymphatics. The rapidity of their growth, as, likewise, the extent of it, is quite indefinite. When this is accomplished, the tumour may remain stationary for a greater or less time, retaining its original organization; or it may at once pass into a second state, that, viz. of *softening*, which must terminate in its destruction. This process, also, is a *vital* process, entirely independent of chemical action; and, on this account, it reacts on the living system, producing on it an impression more or less deleterious;—for example, fever, emaciation, and general disorder of functions*. But should any part of this substance, in any stage of its solution or softening, be detached from the rest, it then ceases to advance in its progressive decay, becoming an inert, or *dead* substance, and capable of acting on the system merely as a foreign body. Case 5, p. 21, affords a still more striking example of what I mean.

CHAP. VIII.

OF ŒDEMA, OR ANASARCA, OF THE LUNGS.

ŒDEMA of the lungs is the infiltration of serum into the substance of this organ, in such degree as notably to diminish its permeability to the air in respiration. Although very common, this disease is

* Vide Dict. des Scienc. Med. ART. *Anat. Pathol.*

very little known. None of the authors who have treated formally of dropsy have mentioned it, and the expression *dropsy of the lungs*, which occasionally occurs in their writings, is generally applied to cases of hydrothorax, or to the supposed existence of cysts of serous fluids in the lungs, the rupture of which was considered as giving rise to Hydrothorax*. Among practical writers, Albertini † and Barrere ‡ are the only ones who have paid any attention to this disease, and who have given any cases of it. The observations of the latter, particularly, prove that he was well acquainted with the affection, although he, perhaps, attached too much importance to it, and did not distinguish sufficiently between it and the first stage of peripneumony.

Œdema of the lungs is rarely a primary and idiopathic disease. It comes on, most commonly, with other dropsical affections, in cachectic subjects, towards the fatal termination of long-continued fevers, or organic affections, especially those of the heart. Peripneumony that has terminated by resolution, appears also to leave a great predisposition to it; and the most extensive and severe cases that I have met with, occurred during a temporary convalescence from severe attacks of this disease. Chronic catarrh, likewise, predisposes to it; and in such cases it often proves fatal by suffocation.

Although this disease commonly is merely consequent on other affections, and often takes place

* Hippoc. de Intern. Affect.—Carol. Piso, de Morb. a serosa Colluvie.—De Haen, Ratio Med. tom ii. De Hydrope Pectoris.

† Comment. de Bonon. sc. inst. tom. i.

‡ Observat. Anatom.—*Perpignan*, 1753.

merely a few hours before death, nevertheless, in some cases, it has certainly lasted several weeks, and even months; and, in a few of these, it even seems to have been idiopathic. The suffocative orthopnœa, which sometimes carries off children after attacks of measles, is probably idiopathic anasarca of the lungs. I have not hitherto been able to verify this conjecture by dissection; but, when we consider the dropsical tendency of such cases, and the frequent complication of measles with peripneumony, it would seem to be well founded.

The following are the anatomical characters of this disease. When it occupies the whole lungs, and has been of some duration, the pulmonary tissue has entirely lost the slight rose tint which is natural to it, and is now of a pale grey colour; it is denser and heavier than in its sound state, and does not collapse on opening the chest. It is, however, still nearly as crepitous as before. It retains the impression of the finger more tenaciously than a sound lung. Its vessels seem to contain less blood than usual, and, when cut into, there flows from it an abundance of serum, which is either colourless or very slightly tawny, transparent, and just perceptibly spumous.

The characters last mentioned would suffice to distinguish this disease from the first degree of peripneumony, (in which the serum effused into the inflamed lung is strongly tinged with blood, and very frothy,) even if the characteristic redness of inflammation did not establish a very marked distinction between the two diseases. However, it is by no means uncommon to find, in anasarcous lungs, some

spots inflamed (as in peripneumony) in the first, and even second degree,—the inflammatory affection gradually shading into the merely œdematous condition of the surrounding parts. Facts of this kind point to the great affinity (which will be noticed more particularly hereafter) between inflammation and the dropsical diathesis.

Whatever may be the intensity of the œdema, it produces no change in the integrity of the alveolar structure of the organ. This fact is not, however, quite obvious until we cut into the diseased lung, owing to the fluid contained in the cellular tissue. When œdema of the lungs has been of long standing and universal, we do not commonly perceive the sanguineous conjestion of the posterior parts of the lungs, as in ordinary cases. The anasarcous affection, which takes place merely a short time before death, is partial, and commonly occupies the posterior parts of the lungs, like the conjestion just mentioned, with which it is often combined.

We must not confound with the true pulmonary anasarca a species of infiltration which often takes place in phthisis, in the intervals of the tuberculous masses. This latter, which is always partial, and of small extent, is formed of a half-liquid, gelatinous-looking matter, which is semi-transparent, greyish, or slightly sanguinolent. Its presence completely hides the air cells, and the parts so affected have quite lost their crepitous character. When pressed they give out a very small quantity of serum, which is not at all frothy. I have already given it as my opinion (p. 40) that this matter is the same as that

composing tubercles in their first or semi-transparent stage, only it has here a less degree of consistence. This opinion rests principally on the circumstance of there being frequently found, in the thicker parts of this species of infiltration, a great many small points, which are yellow and opaque, and obviously consisting of true tuberculous matter.

The first of the following cases exhibits œdema of the lungs in its simple state; the second, with the complication above mentioned; and the third is an example of it supervening to a severe peripneumony before its complete resolution.

Case 24. A woman, aged 47, subject to irregular menstruation for a twelvemonth, was suddenly seized with a severe pain in the left side, attended by dyspnœa and cough. She came into hospital a fortnight thereafter, affected with œdema of the superior extremities, particularly the left,—dyspnœa and cough (not very frequent), with expectoration of white viscid sputa, intermixed with much saliva. These symptoms got better during the first month; but during the second the anasarca greatly encreased, and extended over the whole body, except the face. She had sometimes pain in the chest, and sometimes in the abdomen. The pulsation of the heart was irregular, and the pulse very indistinct;—the patient took little sleep, coughed a little, and expectorated blackish sputa. During all this time the respiration was pretty distinctly audible throughout the chest, but accompanied by that particular noise which I call the *crepitous rattle* (see Part ii). This person died three months after her entry into the hospital.

On examining the body, the cavities of the pleura contained somewhat less than a pint of a limpid serum; the lungs adhered nearly through their whole extent by long cellular attachments, and their substance was throughout little crepitous, and injected by a frothy and nearly colourless serum, which gave the lungs a sort of transparency, and flowed copiously from them when cut into. In other respects the pulmonary tissue was sound, of a pale rose-colour, free from tubercles, and exhibiting no trace of peripneumony, nor even of sanguineous congestion. There was found water in the cavities of the pericardium and peritoneum. The head was not examined.

Case 25. A woman who had been affected (according to her own account) with *asthma* and habitual cough, attended by a slight expectoration, ever since she was nine years old, came into hospital in her forty-fifth year, on account of an aggravation of her dyspnœa and a local pain of the leg. At this time the respiration was short, difficult, and interrupted by fits of coughing, followed by yellow mucous expectoration; the skin was rather cold, the action of the heart regular, and the pulse a little frequent. The chest sounded rather indistinctly in some places, and the respiration was very imperfectly heard throughout its whole extent, and was occasionally attended with a peculiar rattle. During the succeeding month the œdema of the lower extremities, which was very slight on her entrance, encreased; and she had comatose symptoms, which seemed to threaten apoplexy. This continued more or less; the anasarca became general, and, together with a

severe attack of diarrhœa, exhausted the patient, who died about six weeks after her entry.

There was a good deal of water in the head. The right lung exactly filled the cavity of the chest and remained uncollapsed; it adhered throughout to the pleura by well organised cellular laminæ, which were in some places infiltrated with a yellowish serosity. On the anterior surface of the lung several of the air cells were dilated to the size of a hemp-seed. The lung seemed pretty firm; on compression it was found to retain the impression of the finger, and, when cut into, allowed a large quantity of a clear and very frothy serum to escape. In the upper part of the lung there were some points of small extent, here and there, which were somewhat red, compact and not alveolar, and which exhibited the granulated surface when incised. The remainder of the viscus had the natural aspect, and was still sufficiently crepitous, but heavy; it did not yield, like the sound organ, to pressure, being injected throughout with a large quantity of an almost colourless serum, which could be squeezed from it like water from a sponge. The left lung adhered, in like manner, to the pleura, and, with the exception of the peripneumonic appearances, exhibited the same morbid condition as the right. There was, further, on the superior part, a patch of fibro-cartilaginous membrane, two or three lines thick, which, in this place, formed the medium of adhesion between the lungs and pleura of the ribs, to both of which it was intimately united. In the interior of this lobe there was a vast tuberculous excavation, capable of containing a middle-sized ap-

ple (reinette), and which contained merely a small quantity of a very liquid mucosity. It was lined throughout with a polished diaphanous membrane, of a consistence between that of the mucous membranes and cartilage. This cavity was traversed, in different directions, by very white, small, rounded columns, which proved, on close examination, to be obliterated blood-vessels, and which, although continuous with the lining membrane of the excavation, were sufficiently distinguished from it by their shining whiteness and their opacity. The trunks of these obliterated vessels terminated in culs-de-sac, either a few lines within or without the excavation. In the obliterated portions the original cavity of the vessel was still distinguishable by a longitudinal band of greater transparency. Five or six bronchial tubes opened into this cavity, in the manner described in the chapter on Phthisis. (See plate I. fig. 1.) The pulmonary tissue in the inferior part of this excavation was crepitous, though injected with serum; in every other part of the boundaries of the cavity, it formed a layer, two or three lines in thickness, which was flaccid, and of a very deep black colour, owing to the accumulation of black pulmonary matter. There were no tubercles in either lung. There was some water in the pericardium and peritoneum.

The above case is remarkable from the circumstance of the tuberculous cavity being traversed by blood-vessels, a thing which I have already stated (page 3) to be of a very rare occurrence. This case further offers a new proof of the possibility of

cure of tuberculous excavations. From the patient's history it would seem that this vast pulmonary fistula had existed ever since her ninth year.

Case 26. A woman, aged 40, had been always from her childhood of delicate health, and habitually subject to great difficulty of breathing and palpitation of the heart. This state was aggravated, in her twenty-seventh year, by the supervention of general dropsy, of which, however, she was cured by diuretics; from this time her health continued still to decline. In the beginning of January, after having sat up with a sick person for several nights, her respiration became extremely difficult, especially on motion; she lost her sleep and appetite, and she had a slight cough with mucous expectoration. In this state she came into hospital, with œdema of the lower limbs, livid lips, extreme oppression, frequent palpitation, and startings during sleep. The anasarca encreased during the whole of this and two following months; she complained of a severe impediment in the region of the diaphragm, and of a pain between the scapulæ. She died in the beginning of June.

The brain was found natural, but with a small quantity of serum in the ventricles. There was about half-a-pint of serum in each side of the chest, and some cellular adhesions on the right. The upper part of the right lung was sound, only injected with a colourless serum. The middle and inferior lobes were more compact, and discharged, when cut into, a great quantity of transparent colourless serum, intermixed with a thicker, yellowish, puriform fluid. These lobes were, nevertheless, crepitous, with the

exception of a few spots, of small extent, here and there, which had a density equal to that of liver, a yellow and somewhat reddish colour, and a granulated surface on incision. The left lung was in the same state, only without the more solid portions. Both lungs had the yellowish-grey colour, like that of this viscus when infiltrated with pus after an attack of peripneumony, only paler. Indeed, it appeared evident that, in this case, a peripneumony of the inferior portion of both lungs had ended in suppuration, and that the greater part of the pus had been absorbed, the final restoration of the part failing through the debility of the system. The pericardium contained two ounces of serum. The heart was large, its substance soft and easily torn, and its cavities very voluminous.

It may be proper, in this place, to take some notice of that condition of the lungs so often mentioned in this work, and which, if not well understood, may frequently be mistaken as a cause and sign of disease; I allude to the engorgement—(serous, sanguinolent, or sanguineous,)—met with towards the root and posterior parts of the lungs in almost every subject. Bichat first distinctly called the attention of anatomists to this appearance.

This conjestion is very variable as to its appearance and degree. Exteriorly, in the engorged parts, the lung possesses a violet-colour, more or less deep; interiorly, it is more dense and less crepitous than in other parts, and is gorged with a greater or less quantity of blood. Sometimes this blood appears in a state of semi-coagulation, and is with difficulty

completely expressed from the part; it is, however, by no means so intimately combined with the pulmonary tissue, as in the hæmoptysical conjestion formerly described.

The state of this conjestion just described, is such as we meet with in plethoric subjects, whose large vessels and capillary system contain much blood, especially in such as have died of acute fevers or scorbutic affections. In cases of exhaustion, on the contrary, particularly in those who have died of marasmus consequent on cancerous affections, the conjestion shows itself merely by a reddish colour of the parts, without any diminution of their crepitous character, and without any discharge of fluid on their being cut into.

In dropsical subjects, on the other hand, these parts, in place of blood, contain a very frothy serum, more or less sanguinolent, and sometimes hardly yellowish. In this case, the conjestion sometimes greatly resembles the first degree of peripneumony, or œdema of the lungs; and the only means whereby we can distinguish them is afforded by the fact—that the latter affections exist indifferently in any part of the lung, without regard to the laws of gravitation, while the engorgement of the dead body, in obedience to these laws, is always most considerable in the most dependent parts.

Bichat considered the pulmonic engorgement of the dead body, like the marks and bluish stains met with on the back and posterior parts of the limbs of almost all subjects,—as caused by the custom of placing dead persons on their backs. This is doubt-

less the case; yet I am of opinion that the same posture before death, especially in cases of great prostration of strength, may give rise to the accumulation even while life still remains—at least some hours before death. The few attempts I have made to ascertain the correctness of this opinion, by means of the stethoscope, before death, tend to confirm it; if correct in reality, it would account for the rattle and the oppression of breathing observable in most dying persons, even in those whose respiratory organs had remained quite unaffected through the whole course of their disease.

CHAP. VIII.

OF EXTRANEOUS, OR ACCIDENTAL PRODUCTIONS OF THE LUNGS.

SECTION FIRST.

Of accidental productions of the Lungs in general.

Various species of cancer, of cysts containing fluids of different kinds, hydatids, cartilaginous, bony or cretaceous tumours, are occasionally developed in the lungs. At present I shall only take notice of such as I have had occasion to study thoroughly, or which have been particularly noticed by others. These productions are: 1st, cysts, properly so called;

2nd, cysts containing hydatids; 3rd, fibrous, cartilaginous, bony, or osteo-cretaceous tumours; 4th, tubercles; 5th, the species of cancer which I have named *Encephaloid* or brain-like tumour; and 6th, and last, the species of cancer which I have denominated *Melanosis.*

The effect of these various productions on the surrounding tissue of the lungs, is much less than might be expected. In cases of tubercles, for instance, (and the same thing applies to all kinds of accidental productions found in this organ) the substance of the lungs, in the intervals of these, continues equally crepitous as in the sound viscus, and exhibits no trace of the compression which such tumours might be supposed to produce. This is the more remarkable, as, in many cases, the united volume of the tubercles is more than equal to the fourth part of the lung itself, while their weight is one or two pounds: and the circumstance is the more striking when we consider, that a few ounces of effused serum always produces upon some portion of the lung a degree of compression sufficient to render it impermeable to the inspired air, and to produce in it a particular flaccidity, which will be noticed more fully when we come to treat of pleurisy. Sometimes, indeed, we find in the vicinity of one species of tumours (tubercles) the pulmonary tissue impermeable to air, but this obstruction is the product either of the tubercular impregnation (noticed in Chap. 1. Sect. 1), or of the serous infiltration which sometimes takes the place of this, or finally, of true inflammation of the part: in no case, does the

change of structure resemble the flaccidity produced by compression. This flaccidity, however, is frequently observed in the vicinity of pulmonary cicatrices, particularly of those which are hard, cartilaginous, and of an irregular form. I have found tumours of the size of the fist, around which the substance of the lung was quite crepitous, and without any mark of compression.

SECTION SECOND.

Of Cysts in the Lungs.

By the term *Cyst* I understand, with the greater number of modern anatomists, a species of shut sac, commonly rounded, sometimes, however, irregular and anfractuous, and containing a liquid, or, at least, soft matter secreted by the membrane which forms the sac.

There is, indeed, another species of cyst,—namely, that which contains substances of a more solid kind, and which are in their nature different from the ordinary products of the animal economy, and to which productions the cysts, now alluded to, merely serve as an invelope: examples of this species are furnished by tubercles, and the different kinds of cancer. In the present section it is my intention to speak only of the former species of cysts. These are always formed of a natural tissue, that is to say—of a tissue similar to some of those which exist naturally

in the healthy subject. Most commonly they resemble, in every respect, the serous membranes, for instance the pleura and peritoneum—as has been observed by Bichat; sometimes, however, they are more allied to the mucous membranes, as those of the bladder and intestines. Very generally a layer of a fibrous substance, or of condensed cellular tissue, more or less thick and usually incomplete, surrounds these cysts and unites them to the neighbouring parts.

Sometimes we find cysts entirely formed of these two last-mentioned tissues, except that, in this case, there is commonly superadded cartilaginous substance, and also bony plates of greater or less extent. The internal surface of these compound cysts has never the smooth polished aspect of the serous or mucous varieties, but is, on the contrary, unequal, rugged, and frequently studded here and there by a half-concrete, albuminous or fibrous matter, which is intimately united with the cyst itself, and passes insensibly into its peculiar structure.

Of all morbid growths, encysted tumours are most rare in the human lungs. Morgagni gives only one example of the sort. It is, however, by no means uncommon to find them in the lungs of certain animals, particularly of the ox and sheep. These are commonly of the serous kind, consist of a very fine membrane, and contain a thin and very clear fluid. In the human subject I have only met with three or four examples of cysts, and they were all of the kind described in the former part of this section. The largest I have met with was capable of containing an

apple, and was seated in the inferior lobe of the right side. This cyst was very irregular in its shape, and varied in thickness from two to four lines. It was covered internally with an albuminous or fibrinous substance of a yellowish-white colour, very similar in appearance to the middle coat of an artery. This substance had an irregular surface, and seemed in some points as if falling into decay (detritus). Externally the cyst was completely fibrous and resembled tendon in appearance. In some spots it had the character of cartilage, and, moreover, contained several plates or spiculæ of bone. These were of different lengths, and some were placed parallel with the sides of the sac, and some perpendicular to it, so as to project on one side into the cyst, and, on the other, into the surrounding pulmonary tissue. In their latter direction they were, however, separated from the true tissue of the lung, by a thick layer of a fibrous character, which adhered very firmly both to the ossified point and to the substance of the lung, so as to be not at all separable from the latter, although the line of demarcation between the two was very distinctly marked. The envelope or sheath which surrounded these spiculæ, both in the pulmonary tissue and in the coats of the cyst, forsook them on their passing into the cavity of the latter, so that they projected into it quite bare. This cyst contained a yellowish puriform fluid.

SECTION THIRD.

Of Hydatids in the Lungs.

The only species of Hydatids which I have found in the lungs belongs to the genus to which I have given the name of *Acephalocystes**. These animalcules, for a long time confounded with cysts, or encysted tumours properly so called, consist of a simple vesicle of an ovoid or speroid shape, and of very variable size, soft, and of a consistence and appearance analogous to that of white of egg half-boiled. Their coats are diaphanous or semi-transparent, colourless, or of a milky colour, varying sometimes towards reddish, yellowish, greenish, or greyish. The fluid contained in these vesicles is ususlly serous and limpid, sometimes turbid, and tinged with a yellowish or sanguine hue. Sometimes a large vesicle includes several smaller ones; at other times, still smaller ones are found adherent to the internal or external surface of their parent, from which they only appear to be separated when they have attained a certain size.

Hydatids present no distinguishable organ, and offer the simplest example of an animal that can be imagined. This extreme simplicity of conformation has induced some writers to call in question their

* Bulletin de Faculté de Medécine No. 10—1804.

animalcular character. In this place I shall merely observe that M. Percy has seen this species of hydatids move in a very distinct manner, and I have myself observed all the stages of their re-production. This takes place, as in certain polypi, by a process somewhat like *budding*. Small buds form in the thickness of the coats of the animalcule, which project either exteriorly or interiorly, grow hollow, assume the rounded form as they enlarge, and finally detach themselves from their parent.

Hydatids are always inclosed in a cyst which completely separates them from the surrounding parts. These cysts are commonly of a fibrous nature, but frequently there are found in them portions of a cartilaginous or bony character. Their internal surface is rarely smooth; frequently it is so unequal as to have the appearance of being torn. Sometimes it is lined by an opaque albuminous matter, semi-concrete, and partially reduced to detritus, and of a yellow ochrey or tawny colour. When there are several hydatids in one cyst, this further contains a fluid in which they float, which is sometimes limpid, sometimes turbid, yellowish or sanguinolent. When the cyst contains only one hydatid, this sometimes fills it completely, and lines, as it were, its internal parietes.

This species of hydatids may originate in almost every organ in the body. They have been often met with in the lungs; at least, all the cases of hydatids recorded as being found in this viscus, appear to me to belong to this species. The most remarkable are

those published by Johnson,[a] Collet,[b] Malloët,[c] Baumes,[d] and Geoffroy.[e] I shall here give an abridgment of the case of M. Geoffroy.

Case 27. A young man had an attack of peripneumony when 18 years of age, which was perfectly cured, and he remained well two years; he then caught a violent cold, which was attended by acute pain in the left side preventing him lying on it. He never got quite well of this last symptom. He was afterwards attacked with jaundice which lasted three months, and he also passed some portions of tænia. The cough and pain of side returned after this, very violently, and, upon their cessation, he discovered a small moveable tumour situated in the right hypochondre. This tumour encreased and extended towards the umbilicus, being attended by cholic and headache. The pulsation of the heart was very strong in the epigastric region. The principal symptoms at the end of three years were constant dyspnœa, which encreased to a feeling of suffocation on going up stairs;—frequent faintings;—occasional cough and spitting of blood, and constant tremblings. After a year and half, these symptoms encreased, and the fits of suffocation became more violent. In one of these he suddenly expired.

On examination after death, a large hydatid was found partly contained in the liver, and partly projecting into the abdomen. Its coats were thin yet fibrous. It contained a fluid of a brown colour, and a great number of smaller hydatids, most of them of

(a) Philos. Trans. Abridg. (b) Comment. de reb. in scient. nat. vol. xiv. (c) Mem. de l'Acad. des Scienc. an. 1782. (d) Annales de Montpel. tom. i. (e) Bulletin de l' Ecol. de Med. an. 1805.

the size of peas, one or two as large as the yolk of an egg. The lower end of the sac adhered to the small curvature of the stomach. In the chest there was found on each side an enormous hydatid containing five pints of fluid. They adhered to the ribs and the mediastinum, and by their encrease had compressed the lungs into a thin leaf on the anterior part of the cavity. The heart was completely thrust out of the thorax into the epigastrium. Each hydatid was eleven inches long, and contained five pints and a half of a perfectly limpid fluid. It is difficult to learn, from the description of these hydatids, whether they originated in the substance of the lungs, or merely beneath the pleura pulmonalis or costalis. I think it, however, most probable, that they originated in the substance of the lungs. M. Cayol has since presented a case very similar to the above, which has not yet been made public.

In the Journal de Medecine for 1801, there is the case of a man who expectorated for several months, rounded pellicles which were evidently the remains of hydatids, and some seemed to be these merely flattened. I have since seen two similar cases, both of which, as well as that recorded in the Journ. de Med. were cured. On this account the actual seat of these bodies could not be determined, but there can be little doubt of its having been the lungs.

A young woman consulted me being affected with severe dyspnœa, cough, abundant expectoration and emaciation: in short, all the ordinary symptoms of phthisis pulmonalis. One day, after acute pain of

the epigastrium, she evacuated by stool a considerable quantity of hydatids, of a size from that of a filbert to a pigeon's egg. From this very day the hectic fever, the catarrhal symptoms, and dyspnœa ceased, and shortly after the patient regained her flesh and strength. May we believe in this case, that a cyst situated in the left lung made a passage into the stomach or colon through the diaphragm?

SECTION FOURTH.

Of Bodies of a Cartilaginous, Bony, Calculous, and Chalky nature, formed in the Lungs.

These various productions are frequently met with in the lungs, and they have, indeed, been noticed by almost every pathological anatomist since the sixteenth century.

Besides the cartilaginous productions already described in a former chapter, we sometimes find in the lungs cartilaginous cysts inclosing bony or chalky concretions, of the kind immediately to be described; and also cartilages of no regular shape or size, containing here and there points of incipient ossification. The bone which is formed in these cartilaginous bodies, or, without their previous presence, in the substance of the lung, is never of a perfect kind; or, at least, I have never met with any accidental production of this kind in the lungs which had either

the fibrous texture or solidity of the middle of the long bones, or the spongy character of the ends of the same bones. It appears, that, in their formation, a greater quantity of calcareous phosphate, and a much less proportion of gelatine is employed, than in true bone; hence these bodies resemble more a a piece of stone than bone,—a character which accounts for the epithets *calculous* and *tophaceous* given to them by authors. In some cases they do not contain a particle of gelatine; and, in this case, the calcareous phosphate resembles moistened chalk.

I shall notice these different varieties under the name of *imperfect ossifications* and *chalky concretions.*

The imperfect ossifications are encysted, or not encysted. The former are very rare in the lungs. They are of a rounded form, of a size from that of a hemp-seed to that of a hazel-nut, and are inclosed in a cartilaginous cyst, of a line or line and half in thickness, which adheres closely to them.

The non-encysted ossifications are of a very irregular shape. Their surface is rugged and rough. Interiorly they are white, opaque, very similar to calculous productions, and readily reduced to powder by being bruised. On the other hand, their external parts are somewhat yellowish, slightly diaphanous, more difficultly pulverizable, and, in short, in a more perfect state of ossification.

These ossifications are found sometimes included in, and intimately adherent to the pulmonary tissue; at other times they are observed in the centre of a cartilaginous production; and frequently in the body of a tubercle, especially those of the bronchial

glands. In the latter case when the tubercle softens the bony concretion may be found loose in the cavity, or may be expectorated, if it is not of too great a size to pass through the bronchia.

The chalky concretions are found in two states,—one resembling chalk slightly moistened, the other like chalk completely softened in water. In the last state they are always encysted; in the first, they may, or may not be, although they are most commonly so. When crushed between the finger and thumb, they are sometimes reduced to an impalpable powder, but frequently they give the feeling as if grains of sand were intermixed with the soft chalk. These grains are small ossified points.

The cysts enclosing these cretaceous productions are commonly cartilaginous. They are rounded, or without any regular figure. I have seen one in the form of a pyramid with four unequal sides. The rounded cysts are sometimes bony, but of an imperfect ossification, and resembling in all respects, the semi-transparent external crust of the osseo-calcareous concretions described above. I have sometimes found concretions of this sort composed of several bony or cartilaginous cysts, one included within the other, and each separated by a layer of soft cretaceous matter. It is much more common to find this half-fluid chalky matter in the centre of a tubercle, particularly in tubercles of the bronchial glands. In this case, although the matter is equally soft as the substance of the tubercle itself, still it is easily distinguished from it, by its greater opacity, and by its whiteness, which forms a considerable contrast with

the pale yellow colour of the tuberculous matter. When allowed to dry, this cretaceous matter becomes white, and acquires a degree of cohesion which prevents it being pulverised by the mere pressure of the finger.

The bony or cretaceous concretions of the lungs are commonly very small; I have never seen them larger than an almond. Neither have I ever seen the complete conversion of a portion of lung into a substance of this sort, but sometimes I have observed the pulmonary tissue around an imperfect cicatrization as if injected, or impregnated with a small quantity of disseminated chalky matter.

Very singular opinions as to the cause and origin of these calcareous productions are to be found in the writings of most pathologists. Cullen, with many others, regards them as a frequent cause of asthma, and thinks that they may be occasioned by the powdery substances diffused through the air breathed by different kinds of artisans—such, for instance, as starch-makers, lapidaries, lime-burners, &c. The chemical nature of the concretions, so much better known than formerly, renders this opinion quite untenable at the present day. I do not mean to deny that the habitual respiration of a powdery atmosphere may cause a temporary dyspnœa, and even be the source of a formal disease of the lungs; but as a proof that too much stress has been laid on this circumstance as a cause of pulmonary disease, we have only to examine the expectoration of a person who has passed the night in an apartment the air of which has been rendered turbid by the smoke of a

lamp, or of a carrier who has been all day on a road enveloped in clouds of dust:—in either case, we shall find that, in the course of four-and-twenty hours, the whole of the extraneous matter has been expelled along with the bronchial mucus. Besides, if such substances could be retained in the lungs, they would be retained in the bronchia, and we should, in such a case, find there an accumulation of such matters, differing in their nature according to the particular kind of occupation of the individual. Now, I believe, nothing of this kind has ever been discovered on dissection; at least, I can assert that I have never met with any thing of the sort, though I have examined the lungs of a great number of persons who had passed their lives in workshops of which the atmosphere was constantly charged with calcareous or other kinds of dust.

Furthermore, I do not intend denying that the existence of a great number of bony concretions in the lungs may be productive of habitual dyspnœa, more or less severe; but I can assert that I have met with such concretions, and in great quantity, in the lungs of persons who had never experienced any affection of the respiration; and I am convinced, as well by my own dissections, as by those given by other observers, that those concretions have never been found sufficiently voluminous, numerous, or congregated, to justify our attributing to them any case of dyspnœa sufficiently intense to be reckoned by any practitioner under the head of asthma.

The opinions of M. Bayle respecting the effect of these concretions are very singular, quite unsup-

ported by either reasoning or analogy, and, indeed, rather invalidated than confirmed by the facts he has himself adduced. He considers them as one cause of Phthisis, and gives the following statement of the symptoms produced by them: "The greater part of subjects (he says) affected with this disease, expectorate small calcareous fragments, of a greyish or whitish colour, often in great number, and they have a dry cough for a long period."

It is remarkable that M. Bayle mentions neither expectoration, dyspnœa, wasting, nor hectic fever, as symptoms of the complaint, and it is therefore singular how he has been led to reckon it as a species of consumption. The two examples adduced by him are very little to the purpose. The first (case 33) is the case of a man affected for nine months with a slimy expectoration, intermixed with puriform sputa, and occasionally with small chalky fragments. Hectic fever supervened and carried him off in six weeks. A great number of small cretaceous concretions, some soft, some hard, some encysted, some not encysted, were found in the lungs. The substance of the lungs was slightly indurated around these concretions, but, in other respects, healthy. In this instance it is evident that the consumption and death were produced by a chronic catarrh; and I see no reason to attribute the result to the concretions, since we often find them equally numerous without any such consequence. The second example (case 34) is that of a man who died of fever complicated by pleuro-peripneumony. He had experienced for twelve months dyspnœa, frequent cough, and conse-

quent mucous expectoration, but very little emaciation. In this as well as the former case, we find nothing characteristic of true consumption.

In examining the cases of pulmonary concretions of this kind, contained in the writings of Morgagni, Bonetus, and various other authors, it is easy to perceive that, in most of them, the existence of these was productive of no severe symptom, and that even the dry cough, or cough with ropy expectoration,—symptoms most nearly allied to consumption,—was by no means a constant attendant on such a condition of parts. My own dissections afford a similar result. I have often found concretions of this kind in persons who had no disorder of the respiration. Others had a dry cough, or cough with expectoration of different kinds, and with or without dyspnœa; but there was, in almost all these, some other morbid alteration of the pulmonary tissue, to which the symptoms might be attributed with as much (or more) justice as to the concretions.

In particular it is very common to find coexisting with these concretions, traces of cicatrizations in the lungs, of the kind described in a former chapter; and, at the same time, to observe the pulmonary tissue flaccid, hard, and impregnated with a great quantity of black pulmonary matter around the concretions, and the interstices that separate them from the cellular, fibrous, or cartilaginous cicatrices alluded to, (see page 24).

From these facts I am led to believe, that, in most cases, these concretions are consequent on tuberculous affections that have been cured, and are the

product of the curative efforts of nature, which appear to have elaborated a superabundance of the calcareous phosphate, which is necessary to the formation of the cartilaginous bodies which constitute, for the most part, the fistulæ and cicatrices that are found in such cases in the lungs. Several of the cases related (3 and 6) countenance this opinion, and others to the same purpose will be given afterwards.

I by no means, however, wish to assert that concretions of this kind may not take place in the lungs primarily, and independently of the previous existence of tubercles; but I look upon such cases as very rare; and, when they do occur, I am assured that they give rise to little or no disorder of the system.

SECTION FIFTH.

Of Melanosis of the Lungs.

The older surgeons, and, after them, the modern anatomists, have confounded, under the name of *Schirrus, Cancer,* or *Carcinoma,* different morbid growths which have no common character but that of their being unlike any of the natural or healthy tissues of the body,—their originating in an indurated state,—and their subsequent softening and self-destruction. This confusion has proved a great bar to the progress of morbid anatomy. Convinced of this

I have paid particular attention to the discrimination of these various productions, and have succeeded in pointing out several very distinct species. That which I am now to notice, and which I described many years ago (1806) in an unpublished memoir presented to the Faculté de Medecine, is the most easily recognised in all the organs except the lungs, in which, owing to its colour, it is sometimes very difficultly distinguishable from the black pulmonary matter.

In their early or *crude* state, these productions possess a consistence equal to that of the lymphatic glands, and a homogeneous and somewhat humid composition; they are opaque, and, in structure, very much resemble the bronchial glands. When they begin to soften, a minute portion of fluid can be expressed from them, of a thin reddish character, intermixed with small blackish portions, which is sometimes firm, sometimes friable, but which, even when friable, conveys to the touch an impression of flaccidity: in a more advanced stage, these portions first, and subsequently the whole mass in which they are contained, become quite friable and are soon converted into a black paste.

Melanosis may exist in four different forms, viz: 1st, encysted; 2nd, non-encysted; 3rd, impregnating, or infiltrated into the natural substance of an organ; and 4th, deposited on the surface of an organ.

First kind. *Encysted Melanosis.* The cysts enclosing this species are very regularly rounded, and vary in size from that of a small hazel-nut to that of a walnut. At least, I have never met with any

that did not come within these dimensions. They have a very regular and equal thickness, which is never greater than half a line. Cellular substance appears to be the only tissue that enters into their composition. They adhere, by means of a very fine cellular tissue, to the substance of the organ in which they are situated, and from which they can be readily separated by dissection. Their interior surface is rather smooth, but adheres to the morbid matter which it surrounds. The medium of this adhesion appears to me to be a very fine imperfect cellular tissue, though it cannot always be distinguished. I have hitherto only found this variety of melanosis in the liver and lungs; and, in the latter organ, I have only as yet met with a single mass of it.

Second kind. *Un-encysted Melanosis.* This variety is much less rare than the preceding: I have met with it in the lungs, the liver, pituitary gland, and the nerves. The volume of masses of this kind is quite undeterminate,—varying from that of a millet-seed to that of an egg, or more. They are also quite irregular in figure. They commonly adhere very closely to the parts in which they are situated; sometimes, however, they are united to these by a very fine, though sufficiently visible, cellular tissue, which permits their removal without any laceration. In this last case they are commonly of a rounded shape.

Third kind. *Impregnation of the natural tissue with the matter of Melanosis.* It frequently happens that this morbid matter, in place of being segregated in distinct masses, is disseminated throughout the

organs in which it is found, and deposited between the particles or molecules of the natural tissue. The appearance and colour of parts affected in this manner present a good many varieties, according to the texture of the organ, the quantity of morbid matter deposited, and the particular condition of this matter. When the infiltration is recent, and in moderate quantity, the appearance of the affected part merely differs from the natural condition in being intermixed with small black dots or striæ, the intermediate portions being quite of a healthy character. As the disease increases, the dots and striæ enlarge in number and volume, until the whole of the natural tissue of the part is lost in the morbid degeneration. It is usually only at this period of its progress that the melanotic matter begins to soften; but if the softening takes place before the complete removal of the natural tissue of the part, it frequently happens that *this* softens also, and intermingles with the morbid matter, the colour of which is thereby changed to brownish, yellowish, or greenish.

Melanosis, like all the other accidental productions which differ from the natural tissues of the animal economy, gives rise to constitutional and local disorder. Among the constitutional or general effects, the most constant are the gradual diminution of the vital powers, and a marked change in the process of nutrition, whence result emaciation, to a considerable degree, and dropsy of the cellular membrane, and, sometimes, of the serous membranes. The subjects whom I have known to die in consequence of melanosis in any organ, had no continous or well-marked

fever; and this is true of cases wherein the disease extended to a great portion of the lungs, and is also observable in the two cases (20 and 21) of the same affection given in the work of M. Bayle. If this circumstance holds good generally, as I am much disposed to believe, it will assist in enabling us to distinguish, during life, Consumption produced by Melanosis of the Lungs, from that depending on tubercles; which last, as is well known, is accompanied, almost through its whole course, by a hectic fever, which is usually characterised by two exacerbations,—one towards mid-day, and the other in the night.

The most constant of the local effects produced by melanosis of the lungs are dyspnœa, proportioned to the extent of the disease, and cough, which is often dry, but sometimes attended by a mucous expectoration intermixed with some puriform sputa.

The melanotic masses in the lungs may be sometimes completely softened, so as to leave, after their evacuation into the bronchia, cavities resembling those produced by the softening down of tubercles. I have myself never met with excavations of this sort in the lungs; I have met with them, however, in the liver; and the work of M. Bayle contains two cases (20 and 21) which incontestibly prove the possibility of their formation in the lungs. In these cases the pulmonary tissue, so much impregnated with melanotic matter as to be as firm as liver (or even firmer) contained a multitude of small excavations evidently formed by the partial softening of the same matter.

Melanosis is one of the rarest species of cancer, and is extremely seldom met with in the lungs. This may seem an extraordinary assertion after the contrary assertion of M. Bayle, and the cases given in his work under the name of *Phthisis with Melanosis*. Whatever distrust I may have of my own opinions when they differ from those of that excellent observer, with whose extreme correctness I had better opportunities of being acquainted than any other person,—I cannot help, nevertheless, being of opinion that he was deceived on this particular point, and that he sometimes confounded with melanosis, the natural black pulmonary matter. I admit that these two substances are very much alike in their external characters, and I am not sure that the most experienced observer could discover any difference between a melanotic mass in the liver or any other organ, and a bronchial gland of a perfectly black colour, such as they are often found in very sound lungs. I will not say that the following characters suffice to distinguish the two substances, but they may at least assist us in discriminating them:—The matter of melanosis, when softened, and even that which can be expressed from it while yet solid, dyes the skin black; but this colour is not very permanent, and can be easily removed by washing; while the blackness produced by the matter of the bronchial glands, if this be left to dry before washing, will remain on the skin for several days. The chemical composition of the two bodies also differs very considerably. The bronchial glands, according to Fourcroy, contain a large portion of carbon and hydrogen, while the

matter of melanosis contains neither of these, but is almost entirely composed of albumen and a peculiar colouring matter.

Notwithstanding its resemblance to this natural substance, melanosis is evidently a morbid and very deleterious production, inasmuch as it produces all the local and general effects of other cancers, when it exists in a certain extent; and since it is found united with other morbid productions in compound cancerous tumours.

When melanosis forms masses of considerable extent, or when it impregnates the pulmonary tissue so thoroughly as to give it a deep black colour, and a consistence equal to that of liver, it is easily recognized; but when the impregnation is recent, and not sufficiently abundant to produce any notable induration of the lung, it can, with difficulty, be distinguished from the black pulmonary matter.

I have already mentioned this *black pulmonary matter* several times. It has been little noticed by anatomists; yet it exists so commonly in the lungs, and even in those of persons in the most perfect health, that we can hardly consider it as an unnatural or morbid production. It is found more or less abundant in the lungs of almost every adult, and seems to increase with the age of the individual. In early infancy, we perceive no trace of it, and the lungs are of as pure a rose colour as those of the ox, and several other animals. Perhaps this peculiar matter exists only in man, and the carnivorous animals; but I have been too little practised in comparative anatomy to advance any thing on the subject.

When it exists only in small quantity it merely gives to the lung a slight grey tint. On the surface of the lung it appears in small disseminated black dots, which are more numerous and thicker along the intersecting lines of the cells, so as to form striæ, small spots, or punctuated lines. These spots, still further crowded in different places, as well in the interior as on the surface of the lung, form spots still larger and more numerous, so as sometimes to give a black colour to large portions of these organs. In no case, however, does this matter affect the suppleness or permeability of the lung, a circumstance which forms a striking contrast with the melanotic infiltration.

It is particularly in the bronchial glands that this peculiar matter * is found most abundantly. In adults, and especially in old persons, they are often found completely black; in others they are only partially impregnated, as if touched by a pencil. A condition of parts so common cannot be regarded as morbid, especially as it is often unattended by any symptom whatever of disorder. This matter in the bronchial glands would appear to be the cause of the grey colour of the bronchial mucus, which many healthy persons expectorate, and of the small black specks found frequently intermixed with that transparent secretion. This character of the bronchial mucus establishes another distinction between the black pulmonary matter and the substance of melanosis, as the existence of the latter, even in the greatest degree, never gives rise to an expectoration

* Orig. *matiere de melanoses*—evidently a mistake.—Trans.

of a black colour, unless, perhaps, at the very moment of the escape of the softened melanotic mass into the bronchia. (See Bayle's cases 20 and 21.)

The formation of tubercles in the lungs, and, more especially, the cicatrization of the tuberculous excavations, frequently produces, as I have previously observed, a more abundant secretion of the black pulmonary matter. In some cases this abundance is such, as—in conjunction with the compression of the pulmonary tissue produced by the tubercles, the cartilaginous cicatrices and the chalky matter that accompanies them,—to render the affected part notably indurated, flaccid, and more or less impermeable to air. In extreme cases of this kind, it is difficult to say whether the colour and density of the affected part are the consequence of black pulmonary matter or of melanosis. The rule of distinction we ought to follow in such cases is the following:—We ought not to admit the existence of [circumscribed] melanosis, unless we find some of it in portions of some extent, and already softened, or, at least, so deposited and shaped as to distinguish it from bronchial glands. We ought not to admit the existence of the infiltration of this matter, unless it has produced in the lungs a degree of induration equal to that of liver: and when this degree of hardness can be traced to the presence of bony or cartilaginous bodies, we ought to consider the black colour as derived from the black pulmonary matter.

To render this distinction more easy I shall here detail two cases. The first is an instance of melanosis occurring in the lungs and in several other parts

of the body. I prefer it because it exhibits the disease in a great degree of development, and because it was drawn up neither by myself nor by my direction: it is extracted from the register of cases by the hospital pupils for 1816, preserved in the office of the board of administration. The second case offers an example of the difficulty of distinguishing the black pulmonary matter from the matter of melanosis.

Case 28. A woman, aged 59, entered the hospital for an affection of two months' standing, which had arisen after violent grief. The disease commenced with great prostration of strength, loss of appetite and sleep. These symptoms were followed by vomiting and diarrhœa, and the development of small tumours, of a black colour, in different parts of the skin. When she came into hospital, a great number of these tumours, of the form and colour of grains of cassia (cassis), occupied the anterior part of the thorax. The spaces between some of these were filled with small spots very like flea-bites. The tumours were so close on the breasts as to form a large plate or crust. Some of the same sort existed in the abdomen, the largest being two inches in circumference. The arms and thighs, especially on their inside, were marked in a similar manner; the fore arms and legs were without any. In addition to the symptoms already mentioned, the respiration was difficult, there was frequent cough, and the pulse was extremely quick. These symptoms gradually increasing in degree and being followed by œdema, the patient shortly after died.

On dissection the cutaneous tumours were found to consist of a homogeneous substance, of a more or less deep black colour, and of a consistence in some cases very considerable, in others merely pulpy. These tumours had all cysts of cellular substance, and appeared to be evidently of the kind already described as *Melanosis*. They were found in almost the whole of the subcutaneous cellular tissue; also in the same tissue which incloses the vessels, nerves, and the lymphatic glands. In some places they formed by their aggregation masses as large as the fist. The nerves in their vicinity were sound, but the blood-vessels could not be separated from them without rupture. These tumours were found in the thyroid gland; also, in small quantity, in the lungs. In the neighbourhood of the bronchial glands they were numerous and larger: the bronchial glands themselves were not black. They were seen in the substance of the mediastinum, and under the pleura; also, in great numbers, in the mesentery and omentum. All the abdominal viscera, except the liver, were sound, but the cellular substance around them contained similar tumours. The heart and brain were sound.

Case 29. A man, 60 years of age, died after having laboured under cough and expectoration, and other symptoms more or less allied to consumption, but not well marking this disease. For several weeks there were swelling and fluctuation of the abdomen.

On dissection there was found, in the superior lobe of each lung, a large cartilaginous cicatrice, with an external depression similar to those described

in the chapter on Phthisis. The neighbouring parts contained a vast quantity of black pulmonary matter, so as to give to the lung the blackness of ink, and were also interspersed with bony and cretaceous particles. The other lobes were slightly tinged with black pulmonary matter and contained a few immature tubercles. There were adhesions between the heart and pericardium, and the ventricles were enlarged. The abdomen contained a large quantity of a yellowish limpid fluid. The whole peritoneum was of a dirty grey colour, and studded with innumerable small, red, grey, or black points. The red points, united in flakes, had all the marks of being the result of an ancient inflammation. The others seemed to be tubercles in the first stage, grey and semitransparent; they formed small tumours on the surface of the membrane, and some of them were of the size of large hemp-seeds. Those which were of a black colour, and opaque, were evidently formed of the matter of melanosis. These two species of tubercles were most numerous on the intestinal portion of the peritoneum; the red spots or flakes were, on the other hand, most plentiful on the mesentery and omentum. This last was rolled together so as to form a sort of hard and irregular tumour in the left hypochondrium. The peritoneum seemed much thicker and much softer than natural; but this arose from its being covered throughout, between the granulations above mentioned, with a thin and soft coating or layer of albumen.

In the first of these cases there can be no doubt of the nature of the black tumours found in the

lungs. The co-existence of similar tumours in divers other parts of the body, and the absence of the black colour in the bronchial glands themselves, leave no doubt on the subject. In the second case, the question as to the nature of the black matter in the indurated portions of the lungs, is much more difficult. The fact of the existence of bodies answering to the character already assigned to pulmonary cicatrices and, also, of bony and cretaceous tumours; and, further, the immature tubercles in other parts of the lungs, as well as on the surface of the peritoneum—all tend to support the opinion of the black matter being merely the *common* black pulmonary matter. On the other hand, the existence of some melanotic tumours on the peritoneum gives some colour to the suspicion of the black portions of the lungs having derived their origin from the same source. The arguments, however, are decidedly in favour of the former opinion.

I have already observed that M. Bayle appears to have sometimes confounded the matter of melanosis with the common black pulmonary matter. I think he has been equally wrong in classing melanosis of the lungs as a species of phthisis. In fact, the melanotic affection, in place of producing progressive emaciation and hectic fever, the most constant symptoms of tubercular phthisis,—rather tends to produce cachexy and anasarca, and usually proves fatal before the supervention of any marked degree of emaciation. If we were to class diseases from so feeble analogies, we ought to range among consumptive diseases chronic pleurisy, peripneumony, and

catarrh, as well as several diseases of the heart, or, indeed, every disease attended by dyspnœa and emaciation.

In medical writings we find but few cases which can be referred to this disease, melanosis; a circumstance which, no doubt, proves its extreme rarity, since its characters, especially when occurring in any other organ besides the lungs, are so well marked as hardly to be mistaken. Haller relates some of the best marked instances of it. "I have observed," he says, "a horrible species of pulmonary consumption. In one man I found one lung filled, not with pus, but with a matter black as ink; and in another, I have since found a similar fluid in the cavity of the pleura." Notwithstanding the brevity of these notices, it is impossible to mistake, in the first, the infiltration of the lungs with the melanotic matter in a soft state; and, in the second, a secretion of the same matter into the pleura.

SECTION SIXTH.

Of the Medullary Tumour, or Soft Cancer of the Lungs.

This species of accidental production, which was described for the first time in the Dict. des Sciences Med., (Art. *Encephaloïdes)*, is one of those that has been most frequently confounded under the name of *Schirrus* and *Cancer*. It is, indeed, the only species of cancer found in the lungs by M. Bayle, and my-

self. It has received its name from its striking resemblance to the brain.

M. Bayle has considered this disease as constituting a variety of consumption, and has named it *Cancerous Phthisis.* I will not here detail my reasons for rejecting this species, as they are nearly the same as already adduced against the admission of the *Phthisis with Melanosis* of the same author. I may add, that in all the cases which I have met with of soft cancer of the lungs, death has been produced by suffocation before the period when any thing like phthisical symptoms could have been produced. And I am of opinion that the cases of this cancer, uncomplicated with tubercles, detailed in M. Bayle's work,—and even his general description of the disease,—tend to establish the same conclusion. Soft cancer may exist under three different forms, viz. 1st, encysted,—2nd, in irregular masses,—and 3rd, without cyst, and diffused in the tissue of an organ. In whichever of these forms it exists, it presents, in its progress, three different and distinct stages,—viz. 1st, the incipient or crude state; 2nd, its perfect state, in which it exhibits the resemblance to brain which forms its especial characteristic; and 3rd, its soft or dissolved state. I shall first describe it as it is observed in the second, or perfect, state; as this is the condition in which the three varieties most nearly resemble each other, there being much difference between these in their first and last stages.

Soft cancer in its perfect state is homogeneous, of a milky white, and very like the medullary substance of the brain. In different parts it has commonly a

slight rose tint. It is opaque when examined in mass, but in thin slices it is in a slight degree semi-transparent. Its consistence is like that of the human brain, but it is commonly less coherent, being more easily broken and comminuted by the finger. According to its degrees of density it resembles one part of the brain more than another; but it is more commonly like the medullary substance of a brain that is more than ordinarily soft, (or like that of a child's,) than any other part of the brain. When existing in any considerable extent, this species of cancer is, in general, supplied by a great many blood-vessels, the trunks of which ramify on the exterior of the tumours, or between their lobes only, while the minuter branches penetrate the substance of the tumours. The coats of these blood-vessels are very fine, and readily ruptured; and this accident gives rise to clots of extravasated blood in the interior of the tumours, sometimes of considerable size, which bear occasionally a striking resemblance to those found in the brain of subjects dead of apoplexy. Extravasations of this kind may sometimes be so considerable as to supplant almost the whole of the brain-like matter, so that the true nature of the tumour can only be ascertained by some small points, still remaining, of the original growth. This change occurring in superficial tumours of this kind, and being productive of much hæmorrhage, appears to me to have given rise to the name of *fungus Hæmatodes* applied to certain cancers by modern surgeons. Under this name, however, I am also convinced that they have confounded tumours of different kinds,

especially those commonly called *varicose*, which are composed of an accidental tissue very analogous to that of the corpus cavernosum penis. I have never observed any lymphatics in tumours of this sort, but it is probable that the circulating system is complete in them, as I have seen their substance deeply tinged with yellow in cases of icterus. The matter of this species of cancer does not continue long in the state just described; it tends incessantly towards a softer condition, and in a short space its consistence scarcely equals that of a thickish bouillie or paste. Then begins the last stage: the process of softening becomes more rapid until the morbid matter becomes as liquid as thick pus, still, however, retaining its whitish or rosy-white tint. Sometimes at this period, or a little earlier, the blood extravasated from the vessels contained in the tumour, becomes intermixed with the morbid matter, so as to give it a dark red colour, and the resemblance of clots of pure blood. In a short time the extravasated blood is decomposed; the fibrin concretes, and, together with the colouring matter, unites with the brain-like matter of the tumour; and the serum is absorbed. In this condition the morbid growth retains no resemblance to brain; it is of a reddish or blackish colour, and of a consistence like that of paste somewhat dry and friable. Sometimes the change of structure and appearance is so complete, that one would be led to consider the tumours as of a peculiar kind, but for the existence in them of portions of the original matter still unchanged. In other cases, contemporaneously with tumours that have been changed in

this manner, there will be found others retaining the original cerebral character; so that, in all cases, we are able, with a little practice, to discover the true nature of the tumour in all its stages.

Such are the characters which this species of cancer presents in its two latter stages, and equally in all the three varieties. I shall now describe the characters of each of these varieties in the first, or crude, state of the morbid matter.

First kind. *Encysted Medullary Tumour.* The size of this species is very various: I have seen the tumours as small as a hazel nut, and larger than a middle-sized apple. I have found them as large as this in the lungs. The cysts are of pretty equable thickness; and this is never more than half a line; they are of a greyish-white, silvery, or milky colour, and have a semi-transparency, more or less, according to their thickness. Their texture is altogether cartilaginous and rarely fibrous; but it is much softer, and less easily broken by bending, than cartilage: on this account they must be ranged among the *imperfect cartilages.*

The medullary matter contained in these cysts can be easily detached from their inner coat. It is commonly divided into several lobes by a very fine cellular tissue, which may be compared with the pia mater, and the more so from the great number of blood-vessels which traverse it. The fineness and brittleness of these has been already noticed, and also their penetration of the cerebriform matter itself. It is commonly in their early or crude stage that these tumours are divided into distinct lobes. These

are especially observable on their superficies, and have sometimes considerable resemblance to the convolutions of the brain. The cyst does not at all enter between these convolutions, nor does it even indicate on its surface their place or configuration. In this stage the medullary matter is pretty firm, often firmer than the fat of bacon. It is of a dull white, pearl grey, or even yellowish colour, and, in thin slices, has a slight degree of semi-transparency. When cut into, it appears interiorly sub-divided into lobules much smaller than those seen on its surface. These lobules are in such close contact as to leave no interval whatever; and their separation is merely indicated by the reddish lines traced by the vascular cellular tissue by which the separation is effected. These lines rarely cross each other, but exhibit many irregular curves and convolutions.

When these tumours pass into the second stage, their texture becomes more homogeneous, and all distinction of the small interior lobules is quite lost; the distinction, however, of the larger exterior lobes still continues. The blood-vessels which run between these lobes, and in the cellular tissue immediately investing the tumour, are much more developed than in the early stage of the disease, and it is only at this second stage, or as it approaches the third, that the extravasations of blood take place.

The third stage begins, as I have already mentioned, when the medullary matter has acquired a consistence like pap or paste, or like that of a brain softened by commencing putrefaction. In this state it has still much resemblance to cerebral substance.

I have never found that this morbid growth ever softens still more, or that it is absorbed or evacuated, so as to leave an empty cyst or cavity like tubercles. Hitherto I have only found these encysted medullary tumours in the lungs, liver, and cellular substance of the mediastinum.

Second kind. *Unencysted Medullary Tumour.* Medullary tumours of this species are very frequently met with. Their size is very variable; I have seen them from the size of the head of a full grown fœtus to that of a hemp-seed. Their shape is commonly spheroid, but occasionally flattened, ovoid, or altogether irregular. Their external surface is lobulated, but the divisions are less regular than in the encysted species; their internal structure, in the two last stages, is precisely the same. The cellular membrane which invests them is more or less marked, according as they are placed in a loose cellular tissue, or in the substance of a viscus of firm texture: in the latter case, their investing membrane is thinner and less distinct.

In their first or crude stage, their semi-transparency is greater than afterwards; they are almost colourless, or have a very slight bluish tint in ocellated patches: they are pretty hard, and divided into numerous lobes. The aspect of this morbid matter is fatty, like lard; but when incised it does not at all grease the scalpel, and it coagulates by heat without showing a particle of fat. The transition from the first to the second stage takes place in the following manner:—the substance of the tumour becomes more opaque, softer, whiter, and its interior

distinction into lobules for the most part disappears. The original texture is observed longest in the neighbourhood of the external interlobular fissures. In this situation I have found portions still in a state of induration after the mass of the tumours had passed into the third stage. I am led to conclude that the encysted medullary tumour follows precisely the same progress as that just described.

The non-encysted medullary tumours may exist in any part of the body; but they are most frequently met with in the loose and abundant cellular tissue of the limbs, and in the larger internal cavities. I have met with them in the cellular membrane of the fore-arm, thigh, neck, and mediastinum; they are still more frequently found in the cellular substance around the kidnies and the anterior part of the spine, and in these situations they often have a very large size. Although they are frequently found in the viscera, they are, however, much rarer there than in the cellular substance.

Third kind. *Interstitial impregnation of organs by the matter of the medullary tumour.* As I have never met with this variety in the lungs, I shall not describe it in this place. I may merely observe that it is distinguished from the unencysted tumour by forming masses not at all circumscribed, in which the medullary matter approaches nearer to the imperfect or crude state, the more distant it is from the centre of the tumour. It exhibits, moreover, a very heterogeneous appearance, produced by its intermixture, in different proportions, with the different organic tissues amid which it is developed. In the

work of M. Bayle there is a case of this disease in the lungs (case 36) communicated to him by me. I shall not add any in this place, as the medullary is very easily distinguishable from every other species of cancer.

Book Second.

OF THE PLEURA.

CHAP I.

OF PLEURISY, OR INFLAMMATION OF THE PLEURA.

SECTION FIRST.

Of acute Pleurisy.

Pleurisy is inflammation of the pleura. It derives its name from the stitch in the side which is generally its most characteristic symptom. Until very lately, there has been much difference of opinion respecting the actual seat of pleurisy; some placing it in the pleura, others in the lungs, others, again, in both these, and some in the morbid adhesions existing between the lungs and pleura. By the term pleurisy, however, we now almost universally mean, inflammation of the pleura alone, and it is in this limited sense I shall use it in this chapter.

It is, nevertheless, true, that, in many instances, pleurisy and peripneumony exist together; that, in cases where the pleura alone is inflamed, the stitch of the side, which constitutes the principal symptom of the *pleuritis* of the antients, and also of many moderns,—is either not at all, or scarcely perceptible, and then only momentarily; whilst, in other cases where a violent peripneumony is combined with a slight pleurisy, the pain of the side will be extremely severe: still it holds good, that both pleurisy and peripneumony may, and do, exist singly. There are particular epidemics in which they are ordinarily conjoined, others in which they exist separately: but we, in general, find more frequently on dissection, peripneumony without pleurisy, than pleurisy without peripneumony,—a circumstance which may be accounted for by the fact of almost all the cases of simple pleurisy being cured.

Pleurisy is either chronic or acute. The anatomical character of acute pleurisy, like that of the inflammation of all serous membranes, is redness of the part affected. This redness is in some sort punctuated, and looks as if one had traced with a pencil upon the pleura an infinity of small bloody spots of very irregular figure, and very close to one another. These red points occupy the whole thickness of the membrane, and leave small intermediate portions retaining the natural white colour. This punctuated appearance is unquestionably a character of the inflammation, and not at all attributable, as some have supposed, to the partial disappearance of the redness after death. Besides this particular red-

ness,—and even in those instances, where it is very inconsiderable,—we always find the superficial blood-vessels of the pleura redder, more distinct, and more distended than in the natural state.

Many consider thickening of the pleura as a very common consequence of inflammation. I must say, however, that I have never clearly perceived this; and I think there can be no doubt, that, in the greater number of cases wherein it had been thought to exist, the supposed thickening has either been an extensive congeries of miliary tubercles on the outer or inner surface of the pleura,—or a cartilaginous incrustation on the parts covered by it, or, lastly, false membranes, more or less dense, closely adherent to its internal surface.

Inflammation of the pleura is always accompanied by an extravasation on its internal surface, and which may be considered as the species of suppuration proper to serous membranes. This extravasation appears to commence with the inflammation itself. It consists of two very different matters. The one, of a firmer, semi-concrete consistence, is usually termed *false membrane*, or coagulable lymph; the other, very thin and watery, is called *serosity* or *sero-purulent effusion*. Both of these exhibit great variation of character.

The *false membranes* consist of a yellowish-white, opaque, or slightly semi-transparent matter, varying from the consistence of a thick pus to that of boiled white of egg, or of the buffy coat of the blood, to which last substance, indeed, these adventitious membranes bear a strong resemblance in all their

physical characters. This substance closely invests the whole inflamed portion of the pleura, following it, when the inflammation is general, through its whole course, as well on the lungs as on the chest, and forming a sort of complete inner lining of it. When the inflammation is confined to either the pleura pulmonalis, or costalis, the inflamed portion is alone covered by the false membrane. In cases of extensive inflammation, very frequently the portions of false membrane covering the lungs and costal pleura, are united by bands of the same, which extend from one to the other through the serous fluid effused into the cavity. In such cases the false membrane adheres but slightly to the pleura, being readily separated by the handle of the scalpel. These membranous exudations commonly vary in thickness from half a line to two lines; for the most part they are of uniform thickness, though, occasionally, they are thicker in some points, especially on the lower side of the lung and the corresponding parts of the diaphragm. In some instances there are partial elevations or thickenings of the membrane throughout its whole extent, in the form of lines which cross each other so as to exhibit a sort of irregular net-work. Sometimes these linear elevations are so close together, as to give to the membrane the appearance of being studded or granulated with small irregular tuberosities. In both these cases, the intermediate points remaining comparatively thin and diaphanous, when contrasted with the elevated portions, give to the membrane an appearance very similar to the omentum when moderately loaded with fat. This

resemblance is particularly striking when blood vessels are already formed in the false membrane. Sometimes, particularly when the extravasated serum is in great quantity, the false membrane is found either wholly, or in part, detached from the pleura and floating loose in the serosity. We even find detached irregular globular masses, of considerable size, which look as if they had never been adherent to any part. This, however, seems to me quite inconceivable; and I think it more likely that the masses in question were formed in the angular parts of the pleura, near the attachments of the diaphragm and roots of the lungs, and that they have acquired their rounded shape from the motion to which they had been subsequently subjected.

The serous effusion which almost always attends the formation of false membranes, is commonly of a lemon, or light yellow colour, transparent, or with its transparency only slightly disturbed by the intermixture of small fragments, or filaments, of a concrete pus or pseudo-membranous substance. In the latter case it accurately resembles unstrained whey. This resemblance is so great that some practitioners have really fancied that they had discovered milk itself in the sero-purulent effusion of puerperal peritonitis: and, truly, such a mistake might be pardonable, did we not find an effusion exactly similar in the inflammatory affections of all serous membranes, and in men as well as women.

In some cases the serum is of a very deep tawny colour, ruddy, and evidently mixed with blood. Sometimes it is quite bloody. This colour, when very

deep, seems to be caused by a secondary inflammation that has been produced in the false membranes themselves, as, in such instances, we very generally find them very red, or covered with a great number of imperfect yet very perceptible blood-vessels. The portions of the pleura situated beneath false membranes exhibiting this appearance, are much redder than in the most acute recent inflammation. The effused fluid is generally without any smell in the acute pleurisy. I have found it fetid only in a single instance, in the case of a man who died of pleuro-peripneumony after imperfect poisoning by opium. In this case the serosity and false membranes had a sharp vinous odour extremely nauseous.

The relative proportions of the effused serum and albuminous extravasation are not at all fixed. Sometimes the serum is extremely abundant, and the membranous exudation very small, and vice versa. Generally speaking, the more violent the inflammation, the more extensive and thick is the membranous exudation. In weak leuco-phlegmatic subjects, on the contrary, we find a great quantity of limpid serum, with a small portion of thin membrane, often floating in it. In such cases the pleurisy seems to pass insensibly into hydro-thorax, as we shall see more particularly hereafter. In general the limpidity of the serum is proportioned to the quantity of albuminous exudation.

In some rare instances we find a pseudo-membranous exudation uniting the contiguous surfaces of the pleura, without any serous effusion. This would, indeed, be a very common case if we took into our

account those pleurisies which had made some progress towards a cure, as we shall find directly that the absorption of the fluid is the first step in the sanative process. The cases, however, to which I here advert, are those observed in persons dying of some other disease, and who were, at the same time, affected with a slight and partial pleurisy. In these cases we find a white, almost colourless, semi-transparent exudation, which, while recent, readily allows the separation of the parts it unites, and remains on the surface of each, exactly like a thick and moist paste which had united two leaves of paper.

In cases of peripneumony, also, more especially those which are slight and partial, we sometimes find the pleura pulmonalis in the vicinity of the part inflamed, invested by a false membrane, without there having been any attendant serous effusion. We observe the same thing frequently in cases of phthisis, especially at the superior lobes. Such instances of partial pleurisy,—or, as we might name them in contradistinction to the others, *dry*,—are, for the most part, mere complications with some much more serious disease, and are often unperceived, through their whole course, both by the physician and patient. A local sensation of heat, or occasional slight and transient pricking pains, are the only indications of such an affection in cases of consumption.

It is the character of the false membranes produced in pleurisy to be changed into cellular substance, or rather into a true serous tissue like that of the pleura; and this is the natural progress of the pro-

cess when left quite undisturbed. This change is produced in the following manner: the serous effusion which accompanied the membranous exudation is absorbed, the compressed lung expands, and the false membranes investing it and the costal pleura become united into one substance. By and by, this substance becomes divided into layers pretty thick and opaque, which are separated by a very small portion of serosity. About this time blood-vessels begin to make their appearance in it, the first rudiments of which have the aspect of irregular lines of blood, much larger than the vessels which are to take their place. The blood seems as if it had been forced into the substance of the false membrane by a strong injection; and we find the corresponding portions of the pleura redder than elsewhere, and as it were spotted with blood. After a time, the pseudo-membranous layers become thinner and less opaque; the lines of blood assume a cylindrical shape, and ramify in the manner of blood-vessels, but still preserving their augmented diameter. On minutely examining these at this stage, we find their external coat consisting of blood scarcely yet concrete, and very red; within this there is a sort of mould, or rounded substance, whitish and fibrous, and formed evidently of concreted fibrine, perforated in its centre, already permeable to the blood, and evidently containing it. Eventually, the layers of the false membrane become quite transparent, and nearly as thin as those of the ordinary cellular tissue, and the blood-vessels resemble in every respect those which ramify on the inner surface of the pleura. It wants,

however, the firmness of the natural cellular substance, being easily torn in our attempts to examine it, and its vessels still retain the large diameter indicative of their recent formation; and it requires some considerable time for them to attain the perfect character of the original tissues of the body. These productions are not homogeneous;—they consist of many folds, which are united together by surfaces which are cellular, like the inner surface of the pleura, and which contain the vessels; while their exterior surface is smooth, shining, and evidently exhalent, like the outer surface of the pleura to which they adhere. I have sometimes, though very rarely, met with portions of fat in the duplicatures of these bodies. These accidental productions, have, for the most part, a direction perpendicular to the surfaces whereon they originate; that is to say, the line of their direction from the opposite points to which they are attached, forms in general nearly a right angle with the pleura. After having attained this stage, these bodies, whatever may be their extent, do not, in general, affect the health; the respiration even, except in some particular cases, does not suffer from their presence. They possess, in fact, all the characters of the natural serous tissues, being capable of exhalation and absorption like them, and often containing, in cases of dropsy, a considerable quantity of effused serum. Sometimes they even inflame, and, in this case, become invested by false membranes similar to what they themselves had originally been. This is, however, very rare, as I have not met with more than three or four cases of

it, whilst, as we know, nothing is more common than the adhesions we have been speaking of. It is even worthy of remark that, in a second attack of pleurisy, the inflammation, and the albuminous and serous extravasation, seem arrested in their progress by the old adhesions; so that we might almost state it as a general principle, that the more violent has been the attack of pleurisy in an individual, the less apprehensions may be entertained of a second attack. In simple pleurisy we find no sign whatever of inflammation of the pulmonary tissue, even in the vicinity of the most inflamed portions of the pleura; only we find the substance of the lungs, in such cases, more dense and less crepitous, by means of the compression produced by the effused fluids. If the extravasation has been very great, the lung becomes flattened and completely flaccid; it ceases to contain air, and consequently to crepitate; its vessels are compressed and contain little blood; and the bronchia, with the exception of the larger trunks, are evidently rendered smaller. The peculiar texture of the lung, however, is still very perceptible, there being no trace of disorganization like that produced in peripneumony; and if air is blown into the bronchia the lungs become expanded more or less completely. Sometimes, however, we observe, in such cases, certain portions of the lungs, without being more dense than natural, possessing a redness quite like that of muscle, and a compact homogeneous texture in which we can detect no trace of the air cells. When cut into, this species of degeneration presents a smooth surface, without any of the gra-

nular character of lung inflamed in the second or third degree; neither has it any of the spumous bloody serum which is observed in lung inflamed in the first degree. To this state of the lung I would willingly give the name of *carnification*, which has been improperly applied by some authors to the *hæpatization* of the lungs, or peripneumony in the second and third degrees. We find this morbid alteration sometimes in the central, posterior, or inferior parts of the lungs, in cases where the extravasation has been inconsiderable, while the superior parts of the lungs are still crepitous. In other cases, we find here and there, in the middle of a lobe quite in its natural state, portions of the size of a filbert or almond, in this state of carnification. I consider this morbid condition to be the result of a slight degree of inflammation which has undergone a partial and imperfect resolution.

I may here notice one symptom of pleurisy, accompanied by effusion, as it is directly connected with the anatomical characters of the disease: it is the enlargement of the chest. In cases of copious effusion into the cavity of the pleura, this dilatation of the affected side has been noticed by all writers on empyema since the time of Hyppocrates; but I have ascertained that the same thing takes place in the effusions of a recent pleurisy. I have often found it very distinct after two days' illness. It is, of course, much more evident in lean than fat persons; and is very indistinct in women with large mammæ. On measuring the affected side with a piece of ribband, we find it enlarged, but never so

much as it appears to the eye. An increase of half an inch on the circumference is very obvious to the eye. In proportion as the effusion diminishes, the dilatation of the chest insensibly disappears; and sometimes, as we shall see more particularly hereafter, the affected side becomes narrower than before the disease.

SECTION SECOND.

Of Chronic Pleurisy.

Chronic Pleurisy does not differ essentially, in its anatomical character, from the acute. In the chronic disease the pleura is commonly of a deeper red; the serous effusion is more abundant and almost always less limpid, being mixed with a great quantity of very small albuminous flocculi. The abundance and minuteness of these are sometimes so considerable as to render the liquid quite puriform, even when left undisturbed. More commonly, the serum is of a lemon colour, although still less limpid than in the acute disease, and thickly intermixed with the small fragments just mentioned, which, like coarse flour diffused through water, fall to the bottom when at rest. In such cases, these puriform fragments accumulate in great quantity in the most depending parts of the thoracic cavity, and by their consistence form a link between the seropurulent effusion and the false membranes. These

latter never have the consistence of boiled white of egg as in the acute pleurisy. We break them with the greatest facility in detaching them from the pleura, they are friable between the fingers, and sometimes their cohesion is so slight that we might mistake them for a deposition of the thicker parts of pus. The extravasated fluids in chronic pleurisy are rarely so free from smell as in the acute; sometimes they have a heavy odour, more disagreeable than that of healthy pus.

Confining the term *Chronic Pleurisy* to the affection just described, and, therefore, not even including those cases of acute pleurisy which are chronic in respect of their length of duration, we may say that the disease has rarely any natural tendency towards resolution. In cases of extravasations which have lasted several months, we find no mark of any step towards the conversion of the false membranes into cellular substance. A cure, however, is sometimes effected in another manner, as will be shown presently.

The effusion produced by chronic pleurisy tends, most commonly, to become daily more considerable. The affected side becomes manifestly larger. The intercostal spaces grow broader, and rise to a level with the ribs, and sometimes even higher. The lung of the affected side, compressed towards the mediastinum and spine, and retained in this position by the pseudo-membranous exudation which covers it completely, is sometimes reduced to a thickness of little more than half an inch, even in its middle, and, without a careful examination, might be considered

as totally destroyed. In this state the pulmonary tissue is soft, pliant, and dense like a piece of leather, without any crepitation, more pale than natural, occasionally greyish, and entirely without blood. Indeed the blood-vessels are often seen flattened and empty. The cellular texture is nevertheless still very distinct; and sometimes, though rarely, some points are found in the state of *carnification* above described. This case constitutes the *Empyema* of authors, at least of modern authors; for I apprehend no one now considers empyema as the product of a vomica which has burst into the cavity of the pleura. A softened tubercle may, indeed, discharge its contents in this manner, and may thus become the cause of a considerable effusion by exciting a chronic pleurisy, but in such a case the tuberculous matter must only be considered in the light of an extraneous body determining inflammation, and consequent effusion, by its mechanical or chemical qualities. It is also to this species of pleurisy that we must refer those histories of *lungs entirely destroyed by suppuration* which we find recorded in the older writers.

Such is the nature of true chronic pleurisy; and, restricted as I have done, it exhibits, in none of its stages, the intense fever, power of reaction, and acute pain, that characterise an active disease. It commonly attacks subjects of a worn-out constitution, more especially such as have suffered from a tubercular affection of the lungs or other organ. This complication with other diseases, as well as the usual want of prominence of its symptoms, both general and

local, cause it, for the most part, to be overlooked, and almost always misunderstood.

There is still another species of chronic pleurisy, viz. the acute disease, become so, from any cause which prevents the absorption of the effused fluids and the conversion of the false membranes into cellular substance. The disturbing cause in this case is, also, generally one arising from a weak condition of body produced by other diseases.

The acute pleurisy, after having passed into a chronic state, may exhibit many varieties. Two of these we shall notice presently, and a third under the head of Hydrothorax. A fourth variety is produced by a superfluous afflux of blood taking place to the false membranes, at the period of the development of the new vessels in these. In this case the new-formed parts, and the effused serum, are found deeply tinged with blood, and small clots of pure blood are occasionally met with. This state of parts furnishes a great obstacle to the cure of the disease, and seems to be the cause of a peculiar modification of the adhesions, which is to be taken notice of hereafter.

SECTION THIRD.

Contraction of the Chest consequent on certain Pleurisies.

THERE are some cases of Pleurisy wherein the affected side never becomes sonorous, in the trial of

percussion, although the disease has been completely cured and the effused fluids absorbed. Although cases of this sort are not very rare, they have not hitherto attracted sufficiently the attention of practitioners; and I apprehend that the pathological character of the affection, although noticed by several authors, has not as yet been correctly or completely described. The subjects of this morbid alteration are sufficiently distinguishable even by their external shape, and by their gait. They seem always to lean towards the affected side. This is always manifestly narrower than the opposite side, there being frequently more than an inch of difference, when they are both measured by means of a cord. The length of the chest is equally diminished; the ribs are closer to one another, the shoulder is lower, and the muscles, especially the pectoral, are only half the size of those on the opposite side. The difference of the two sides is so remarkable, that, at first sight, we would think it much greater than it is found to be by admeasurement. The spinal column generally remains straight; sometimes, however, it at length yields through the effect of the habitual leaning towards the diseased side. This habit gives to the individual the appearance of being somewhat lame. (See Plates VI. and VII.)

The greater number of individuals in whom I have detected this deformity attributed it to some severe and long-continued disease of the chest, the exact character of which had never been ascertained. I have more than once pointed out this alteration of the form of the chest to individuals, in whom it

existed in a great degree, who were not themselves at all aware of its existence. All these had experienced a severe disease of long duration, the principal site of which had seemed to be in the thorax. In several, the disease appeared not to have been very violent. Some had had pleurisies, or pleuro-peripneumonies with very marked symptoms, and which had been long in getting well. I was long aware of this state of the chest before I had an opportunity of ascertaining its cause by dissection. Most of these patients were short-breathed, yet could not be said to have habitual dyspnœa. Cases of very great contraction are rare; but those of a slight degree of it are very common.

This morbid contraction of one of the thoracic cavities arises from a somewhat irregular termination of chronic pleurisy, or of the acute pleurisy become chronic. In these cases the sero-purulent effusion having continued for a long time, the false membranes which invest the pleura and lungs acquire a particular hardness, and an incipient organization, which render them incapable of being converted into cellular substance. When the effusion is absorbed, the lung, long compressed by it, and further bound down by a strong false membrane completely investing it, cannot dilate itself sufficiently promptly to keep pace with the progress of the absorption; the ribs, consequently, contract, and the cavity of the chest is thus diminished. When the fluids are completely absorbed, the costal and pulmonary exudations come into close contact and finally unite, so as to form only one substance. The

consistence of this becomes daily firmer, and, after a few months, acquires the consistence and all the other characters of a fibrous or fibro-cartilaginous membrane.

If we dissect carefully this species of membranous production, we find that, although it adheres closely to the pleura of the ribs and of the lungs, it can be detached from these almost entirely. If we cut it transversely we find it composed of three different layers; two exterior, which are opaque, white, and completely fibrous, sometimes cartilaginous and even ossified in certain points; and one intermediate, which is semi-transparent, and resembling, in every respect, the central and most transparent portions of the intervertebral cartilages. This last layer is evidently the medium of union between the two others. Although it be obviously a posterior production, and can only have taken place after the organization of the false membranes had been far advanced, I do not consider it as strictly the product of inflammation. I would rather consider it as analogous to the gelatinous and semi-transparent exudation which forms the first step in the union of bone and tendon. The ordinary thickness of these fibro-cartilaginous membranes varies from two to five lines. This gradually lessens for a time after their formation, and is proportioned to the thickness of the layers which have given rise to it. In some cases of chronic pleurisy I am disposed to believe that there may be an albuminous extravasation on the pleura without any observable serous effusion; and that, in this case, there may be union of the

lungs to the side by a fibro-cartilaginous membrane (formed of this) which does not exhibit the three distinct layers above described.

These fibro-cartilaginous membranes have been commonly described under the name of *thickenings* of the pleura; and this is a mistake very likely to be committed by those who trust to the mere appearance of these, without further examination. On dissecting these we can always separate them from the pleura, which is found of its natural thickness. We must not confound these membranes with the fibro-cartilaginous incrustations of a like nature, which are sometimes formed on the exterior or adherent surface of the pleura, and which I have described elsewhere. (Dict. des Sc. Med.)

The contraction of the chest, which coincides with the period of the absorption of the serous effusion, is frequently not to be perceived till after several months of disease: frequently, even, the patient has long been in a state of doubtful convalescence before it is at all manifest. At length, however, after a long period of ill health,—sometimes of no less duration than two or three years,—the patient regains perfect and often permanent health.

On examining the chests of those who had this contraction in a very decided manner, I have uniformly found the fibro-cartilaginous membrane above described; and I have further found the lung in that state of compression and flaccidity, which rendered it extremely like a piece of muscle of which the fibres were so fine as to be undistinguishable. Sometimes the compressed lung is as red as muscle, and

at other times, of a grey colour more or less deep. This last I consider as the proper colour of lung simply compressed, and imagine the red colour to be given by a sort of passive congestion of blood in the part. The morbid state of parts we have been describing seems to exclude almost the possibility of a relapse: for if this be rare in cases where the lung and pleura are united by cellular substance, it ought to be infinitely more so when the uniting tissue is one so very little disposed to inflame as the fibro-cartilaginous.

Although in all cases of considerable contraction I have found the fibro-cartilaginous membrane, I am inclined to think that there may be a certain degree of diminution of the chest in cases where a pleuritic attack has terminated slowly by means of cellular adhesions only. Such adhesions, however, undoubtedly exist very frequently without being attended by any contraction of the chest, or, indeed, by any perceptible affection of the respiration or general health, since we know that they are found, more or less, in almost every adult body. It is not the adhesions, whatever be their nature, that occasion the contraction of the chest, but the more or less tardy development of these. The more rapid has been the absorption of the effused fluid, in a case of pleurisy, the less likelihood will there be of the contraction taking place. The fact is, that the pulmonary tissue, like every other part of the living body, the longer it has been subjected to compression, the less readily will it return to its original state when the compression is removed. A limb long compressed by a

bandage will regain its size much more slowly than one that has been bandaged for a few hours. The consequence of this is, in the case of the compressed lungs, that as they do not yield sufficiently fast to fill the cavity left by the absorbed fluid, the thoracic parietes must contract proportionably in order to prevent the vacuum that must otherwise take place.

This contraction of the chest, consequent on pleurisy, being but little known, I shall give here a few cases of it. The first and second afford examples of the disease after it has passed through all its stages; the third exhibits its progress, and, also, the state of parts anterior to its final termination; the last is a more curious complication of symptoms.

Case 30. A woman, aged 30, had been affected with cough for several years, but much more severely within the last four months. She came into hospital in the last stage of consumption, much emaciated, with hectic fever and purulent expectoration. She died fourteen days thereafter. Upon inspecting the body after death, the left side of the chest was found to be evidently diminished in all its dimensions; the intercostal spaces were so much contracted that the ribs seemed to touch each other. The right side was of natural form and size, and appeared larger than the other by one-half. This deformity had not been observed during life, owing to the patient's clothing. The right lung adhered to the diaphragm and the mediastinum, in its whole extent, by well-organized cellular adhesions. This lobe contained many tubercles in every stage. In the superior lobe there was one tuberculous excavation capable of

containing a small pullet's egg. The left lung was one half less than the right; it was retracted towards the spine and ribs, so that its internal surface was turned forwards, yet did not reach further than the origin of the cartilages, and did not at all cover the heart: it adhered so firmly to the ribs that it could not be separated without detaching it from its investing pleura. This adhesion was effected by the medium of a substance altogether similar, in texture, colour, and consistence, to the fibro-cartilaginous bodies. This substance was about two lines in thickness, and was divided into two layers, which were separated from each other by a third, much thinner than they. This was of a bluish-grey colour and semi-transparent,—qualities which formed a contrast with the whiteness and opacity of the others. This intermediate layer resembled perfectly the transparent central portion of the intervertebral fibro-cartilages; it was less solid than the other two, yet possessed, with them, the fibrous structure. The pleura pulmonalis and costalis, especially the former, were very distinct exterior to these false membranes. The pulmonary tissue, more flaccid and redder than natural, had lost its crepitous feel, and was of the aspect and consistence of muscle.

Case 31. In March 1818, a man, aged 18, came into hospital, affected with recent diarrhœa and a complaint of the chest of some standing. In the winter of 1816 he had been affected with a violent cold, attended by severe cough, much dyspnœa, and great pain of the left side. This side of the chest was now evidently smaller than the right in every

dimension; and the shoulder being thereby lower, the man had the appearance of being lame. He bent the left leg more than the right, and when he stood upright he seemed to support himself on his left hip. This side yielded a dull sound, on percussion, and the sound of respiration was scarcely audible (by the stethoscope) in any part of it: both these were otherwise on the right side. This man's diarrhœa continued with some intervals of amelioration, but eventually with the addition of abdominal tenderness, and he had an attack of severe pain of the right side increased by cough and inspiration. These symptoms, especially the diarrhœa, exhausted his powers, and he died in August.

The left side of the chest was found one-third smaller than the right, and the intercostal spaces much narrower. The lung on this side was intimately united to the pleura of the ribs, in its whole extent, by a false membrane one line thick in its superior part, and two lines in its inferior part. It was white, of a consistence almost equal to that of fibro-cartilage, and of a texture somewhat similar; as fibres, both longitudinal and transverse, were very visible in it, especially at its inferior part. In several places this false membrane was united to the pleura by means of cellular substance containing serum; in other places, these two were closely united, yet still very distinguishable from each other. The lung was flattened upon the mediastinum. Its substance was still somewhat crepitous, but flaccid and injected with serum. It contained many tubercles, for the most part miliary.

The right lung adhered to the costal pleura by means of a soft false membrane, which exhibited reddish vascular points on its surface. A still thicker layer of the same kind invested the diaphragm and adjoining lung. There was a little reddish serosity in the cavity of the pleura. The tissue of the lung was crepitous, containing a considerable quantity of serosity, and, also, several miliary tubercles.

Case 32. A man, aged 66, in October 1817, caught a severe cold, marked by cough, and subsequently by great pain in the chest and hœmorrhage from the lungs. This attack was followed by hectic fever, constant cough and dyspnœa. He came into hospital in March, affected with much cough, very viscid yellowish expectoration, and hard and frequent pulse. In the left side of the chest percussion elicited a clear sound, and the murmur of respiration was distinctly heard through the stethoscope: both these indications were considerably less distinct in the right side. The disease seemed to decrease for several weeks in this and the following month; but the cough and expectoration still continuing, and his lower extremities becoming swelled, he lost ground in the end of May, and emaciated considerably. In the beginning of June we first perceived the intercostal spaces on the right side to be diminished in width: by the middle of the month the general contraction of this side of the chest was very distinct. This man died towards the end of the same month.

On examining the chest after death, it was found that the diameter of the right side, both laterally

and from before backwards, was less by an inch than that of the left; and the intercostal spaces were narrower.

The left lung was of natural size, had no adherence to the pleura, and was crepitous throughout. It was gorged with blood, especially on the posterior part. It contained some tubercles in the early stages. The left lung was one third less than the right, and adhered intimately to the costal pleura by its whole upper lobe as low down as the second and third ribs. This adhesion was effected by a well-organized cellular tissue, evidently of antient date. The remaining pleura of the lungs and ribs, in the whole of the lower part of the lung and the anterior portion corresponding with the false ribs, was also closely united; but this adhesion, which was evidently of recent date, was effected by means of a concrete albuminous layer, three lines in thickness, of a yellow colour and opaque, and partially tinged with blood. This membraniform layer could be removed in plates or folia, which were of greater firmness the nearer they approached the pleura, on either side,—especially the pleura pulmonalis,—on which they had a degree of consistence nearly equal to that of the fibro-cartilages. On the contrary, the centrical layers were hardly of a tenacity double that of boiled white of egg. At the point of junction of the ribs with their cartilages and on the anterior and exterior parts of the lung, this albuminous stratum divided into two layers, one of which invested all that portion of the lung remaining unattached to the side, and the other the corresponding portion of the

pleura; and these two afterwards united so as to form a shut sac or pouch. The inner surface of this sac was nearly throughout of a bright red colour, which seemed as if applied with a pencil, and amid which no traces of vessels could be distinguished. This red colour did not at all enter into the substance of the albuminous stratum, which was, throughout, of a yellowish white, and slightly semi-transparent, becoming more white and opaque as it approached the pleura. This sac contained about two glasssfuls of a bloody but limpid serum, which compressed, at this part, the lung towards the mediastinum, leaving a space between it and the ribs of an inch and half at its greatest width. Eight or ten pseudo-membranous bands crossed this cavity, being attached, at each end, to the pleuritic layers. These were softer and more fragile than old cellular adhesions; they were very thin, diaphanous, and colourless, towards their middle, but at their extremities they assumed greater firmness, and also the opacity and colour of the layers to which they are attached.

In the top of this lung there was an external depression, corresponding with a fibro-cartilaginous substance internally, such as formerly described under phthisis pulmonalis, and which I showed to be a true cicatrization of a tuberculous cavity. In its interior parts the lung was flaccid, not crepitous, dry, and resembling muscular flesh. In the upper portion there were many immature tubercles.

The pleura, in the parts corresponding to the false membranes, was much redder than natural. The heart was sound.

The cavity of the peritoneum contained about four pints of a reddish serosity, partially limpid. The whole of the peritoneum, as well on the abdominal parietes, as on the mesentery and intestines, was studded with innumerable small, grey, semi-transparent tubercles. Upon the mesentery and bowels these were quite transparent, and of the size of millet-seed; on the abdominal parietes they were flatter, greyer, and less diaphanous. The peritoneum was, moreover, marked in different places, by red, punctuated spots, which were either of a bright red, or almost black. In these points, on scraping with the scalpel, a small quantity of a semi-transparent exudation, of a grey colour and mixed with dots of blood, could be detached. This matter was very like paste, only a little firmer. It was so thin as only to be discovered by scraping: after its removal the peritoneum appeared somewhat less red. The tubercles seemed to be so intimately connected with the peritoneum, as not to be detached by scraping: this membrane was not sensibly thickened.

Case 33. A boy, 12 years of age, was attacked with a severe pectoral affection, marked by violent cough, acute pain of side, dyspnœa and fever; followed, in a few days, by considerable hemoptysis, and, subsequently, by expectoration of a purulent fluid in great quantity. The disease then took a chronic form; and, in the course of a few months, an abscess pointed externally between the cartilages of the seventh and eighth ribs, which, when opened, discharged a considerable quantity of pus. Since then (now six years) the aperture has remained fis-

tulous, daily discharging one or two spoonfuls of pus. Occasionally, during a temporary obstruction of the orifice, the expectoration of this patient has become augmented, and the sputa have been then always perfectly like the pus usually evacuated from the abscess.

At this period I examined the patient. He was much emaciated, but not like one wasted by consumption, the emaciation being confined rather to the bones and muscles, than to the cellular membrane. He was extremely small for his age. The left side of the chest was at least one third narrower than the right, and this contraction was most remarkable at the inferior margin and in the antero-posterior diameter. On examining the thorax the whole right side yielded a clear sound on percussion, but one less distinct on the left. The respiration was quite distinct over the whole of the right side; it was very indistinct in the superior part of the left side, and quite inaudible in the whole inferior portion. Pectoriloquism, also, existed in the lateral and superior part of the same side.

From all these circumstances it is evident that in this case, in the first instance, the maturation of one or more tuberculous masses had been attended by an acute pleurisy; that, although the tubercles, when softened, had been expectorated, yet that a communication between the remaining excavations and the pleura had been subsequently established, which had given rise to the external abscess. The eventual formation of a fibro-cartilaginous membrane had produced the union of the lungs and pleura, and

the consequent contraction of that side of the chest. As this patient has already lived so long with this affection, it is probable, if the expectoration does not greatly increase, that he may survive a long time yet. Willis relates a case similar to the above.*

SECTION FOURTH.

Of Gangrene of the Pleura, and of the false Membranes consequent to Pleurisy.

GANGRENE of the pleura is a very rare disease. It is always of very small extent, is scarcely ever a primary affection, or a termination of the acute inflammation. Most commonly it is the consequence of the bursting of a gangrenous abscess of the lungs into the pleura, (see page 55) and occasionally it supervenes to chronic pleurisy.

This disease presents the appearance of soft gangrenous spots, of a brownish or blackish green, round or irregular, and not extending beyond the pleura. When these gangrenous patches have been removed by the softening down of their substance, the borders of the ulcerated part left behind, remain blackish for a long time. Sometimes the parts beneath the pleura are affected to a very small depth; and almost always the cellular substance becomes greenish and filled with serum to some distance around the eschar. In some instances the intercostal muscles, the neighbouring portions of the lung, and

* Op. omn. Lib. ij, Cap. xiij. Sect. 1.

even the ribs, participate more or less in the disease; and all exhale the gangrenous fetor.

A general inflammation of the pleura, and the consequent formation of false membranes to a great extent, and a copious effusion, always follow gangrenous affections of the pleura, if these are not the consequence of an old pleurisy. In every case the false membranes, whether old or new, put on the gangrenous character in a greater or less degree. This is particularly observable in the case of a gangrenous abscess bursting into the pleura. Only once have I found this state of the pleuritic membranes, in a case where the gangrenous abscesses were still without any communication with the cavity of the pleura, and where the gangrene of the false membranes seemed to be idiopathic. It sometimes happens in chronic pleurisy that a gangrenous eschar forms on the pleura, and permits the effused fluids to escape through the intercostal muscles, so as to be finally evacuated, either naturally or artificially, and that the empyema is thus cured. This species of abscess has been long known. It is, however, very rare; M. Recamier has only seen it twice, and I have only met with one case of it.

Besides gangrene of the pleura, nature has one other way of evacuating, externally, the sero-purulent effusion of the chest; this is by the formation of an abscess between the layers of the intercostal muscles, or between these muscles and the skin, which, bursting both externally and internally, affords a passage for the discharge of the contained fluids. I have met with a single case of this kind.

A cure has frequently followed the evacuation procured by means of these kinds of abscesses. This is, however, rarely complete; and it is more common for the disease to degenerate into an incurable fistula, which is frequently kept up by a carious state of the neighbouring ribs.

SECTION FIFTH.

Of circumscribed Pleurisy.

It occasionally happens, particularly in chronic pleurisy, that the effused fluid is confined to a partial space of small extent, owing to the obliteration of the remainder of the cavity of the pleura by former adhesion. These circumscribed pleurisies are observed in the three following situations chiefly: 1st, the inferior and lateral part of the cavity of the pleura; 2nd, the space between the base of the lungs and the diaphragm; and 3rd, the fissures between the different lobes. In these cases the effused fluid, which is commonly puriform, is enclosed in a false membrane which lines very exactly the surrounding parts.

When seated in the fissures between the lobes, the edges of these are found closely adherent by means of cellular substance of recent formation, while the opposing surfaces of the lobes themselves are separated by the interposed effusion. Bayle was the first who described this species of partial pleurisy, which

an inattentive observer might easily mistake for an abscess of the lung. This species is very rare, a thing which seems rather singular, when we consider how often we find the edges of these interlobular fissures adherent in cases of peripneumony attended by a slight pleurisy. In such cases it would seem that the resolution of the peripneumony leaves these fissures converted into a sort of sac, which will occasion the circumscribed effusion we have been describing, in the event of that part of the pleura being afterwards attacked by inflammation.

The second variety of circumscribed pleurisy is equally rare, and presents precisely the same anatomical characters. The third variety is not uncommon. These partial collections of matter, when in any considerable quantity, press forcibly on the side of the lungs (as this is the only direction in which they can extend) and produce a sort of cavity in these, as if there were actually a loss of substance. If, however, on evacuating the pus, we remove the false membrane which lines the apparent abscess, we immediately perceive that the lung is merely compressed, and that even the pleura is uninjured.

I shall conclude this account of the several varieties of pleuritic inflammation, with several cases which illustrate many of the statements already made. In all of them will be found the complication of *air effused* into the cavity of the pleura, a complication which will be treated of more particularly, by and bye, under the name of Pneumo-Thorax.

Case 34. A man, aged 32, was seized for the first

time, in May 1817, with a catarrhal affection, attended by cough, dyspnœa, &c, which continued, with variable severity, until the beginning of November, when he came under my care. At this time there were considerable emaciation, hot skin, small and frequent pulse, short and quick respiration, much cough, and considerable expectoration of opaque, yellow and very viscid sputa. The stethoscope gave indication of tuberculous excavations in the lungs. The febrile and inflammatory symptoms continued; and, during the course of the following month, acute pain in different parts of the chest supervened: at the same time, the cough became more troublesome, and to the yellow opaque sputa there was now superadded a copious discharge of transparent and frothy mucus. Percussion of the thorax yielded a much clearer sound on the right than on the left side; while the respiratory murmur was distinct in the latter, and not at all perceptible in the former. The tinkling metallic sound, already alluded to (and which we shall hereafter find to be characteristic of the simultaneous existence of air and some liquid in the chest) was, also, very audible on the right side. The patient lay almost constantly on the right side, the intercostal spaces of which could now be perceived to be wider and more prominent than natural, and the subcutaneous veins more obvious. All these symptoms indicated the supervention of a pleurisy, with effusion of both air and a liquid of some sort into the right side of the chest. Towards the end of January the patient first perceived the fluctuation of a liquid in his chest when he turned himself: the

same thing was very distinctly heard by the bystanders when the trunk was shaken in a sitting posture. In February the sputa amounted to about six ounces in the twenty-four hours; they were yellow, opaque and puriform, intermixed with bubbles of air, and swimming, as it were, in a large proportion of a transparent and diffluent mucus, in which there were sometimes streaks of blood. One day in this month, he expectorated, after a fit of coughing, as much as he usually did in the whole twenty-four hours. At this time the operation of empyema was performed, between the sixth and seventh ribs, by means of a trocar only one line in diameter. Two pounds of matter flowed in twenty minutes. This matter was puriform, opaque, of a slightly-greenish yellow colour, and scarcely fetid. As it flowed it was intermixed with some air-bubbles; and, on settling, it separated into two portions,—the one, opaque and yellow, and composed of small yellowish flocculi,—the other, thinner and transparent. The patient felt relieved in proportion as the matter flowed, and this alleviation continued for two days, but he sunk on the 12th day after the operation.

On examining the body after death, we found that the succussion of the trunk produced the sound of fluctuation as before. On puncturing the thorax a gaseous fluid escaped. The right side of the thorax was larger than the left, and contained two pints of a sero-purulent fluid. The whole extent of the pleura, on this side, was lined by a thick layer of coagulable lymph, the consistence of which varied in different places, from that of soft cheese to one

nearly equal to that of cartilage: it was softer on the surface, and more dense where it touched the pleura. It was several lines thick on the lungs, and on the right side of the mediastinum and diaphragm; it was thinner, softer, and more easily detached, on the pleura of the ribs and remaining portion of the diaphragm, both of which were of an intense punctuated red colour. The pleura of the lungs had none of this punctuated appearance, and the layer in contact with it, which was of a cartilaginous firmness, could not be detached from it. The lung was compressed towards the spine and posterior part of the ribs (to which it closely adhered), so that it hardly occupied one third part of the cavity. The pulmonary tissue was flaccid, but still somewhat crepitous, and permeable to the air in its posterior part. There were several tubercles in this lung, from the size of a cherry-stone to that of a filbert, and almost all softened to the consistence of curd. Five of these, of a somewhat larger size, quite softened and nearly empty, communicated on the one side with the bronchia, and, on the other, with the cavity of the pleura, by openings of from one to three lines in diameter.

The left lung was of the natural size, and contained, also, a great many tubercles in different stages of maturity:—the greater number being small and diaphanous;—a few, quite softened but not communicating with the bronchia. The mucous membrane was very red through its whole extent, and there was a small ulcer in the posterior part of the larynx. There was a small quantity of serum in the pericardium, and, also, in the peritoneum.

Case 35. A man, aged 20, who had been unwell (he said) for six months, and who had suffered from diarrhœa for the three last, came into hospital in January, exhibiting all the usual symptoms of confirmed Phthisis, and, among others, that of a very distinct pectoriloquism at the superior part of the left side of the chest. In the beginning of March a sudden alteration took place in the symptoms: the respiration becoming more difficult, attended with pricking pains in the right side, the pulse getting quicker, the skin hotter, and the face flushed. On examining the chest at this time by percussion and the stethoscope, it was found that the right side, which on the day before had yielded only a dull sound, now resounded more than the other; while the respiration was very perceptible on the left side, and not at all on the right. These symptoms I regarded as indicating pleurisy, arising from the irruption of tuberculous matter into the cavity of the pleura, and attended both by liquid and gaseous effusion. I wished farther to ascertain the effusion by the succussion of the chest, but the patient was too weak to undergo the trial, and he died four days after the marked change in the symptoms.

The fluctuation of the fluid in the right cavity of the chest was very perceptible, on succussion, after death. This side appeared, also, larger than the left; when struck it emitted a clear sound; and when punctured an elastic fluid escaped from it with a hissing noise. There was found in the cavity of the pleura a considerable quantity of a sero-purulent liquid, of a greenish-yellow colour, and semi-trans-

parent, notwithstanding the great portion of puriform fragments that floated in it. The pleura was lined throughout with an opaque albuminous exudation, of a yellowish-white colour, easily scraped off by the scalpel, and of the consistence of curdled milk. This layer was of considerable thickness on some parts of the ribs and diaphragm, and thinner on the lungs. The lung on this side was compressed into one third or one fourth its natural volume against the spine and mediastinum, to which last it closely adhered. It was flabby and very imperfectly crepitous through its whole extent, and contained hard tumours, which were evidently tubercles. On the closest examination no opening could be discovered on its surface. In the very summit of the superior lobe there were found three tuberculous excavations; two of which, of the size of a hazel-nut, were full of soft matter, and the third, six times as large, and capable of containing a pullet's-egg, nearly empty. This vast cavity was lined by two membranes, the interior (that in immediate and close contact with the pulmonary tissue) of a semi-cartilaginous density, and the exterior soft, almost entirely opaque, and easily torn. The former existed only in some points; the latter was complete. The remainder of the lung was filled by miliary tubercles. The left lung appeared quite sound, only containing a few miliary tubercles.

Case 36. A man, 35 years of age, while in hospital for a chronic affection of the knee, was suddenly attacked, in January, with pleuritic symptoms, viz. head-ache, pain in the chest aggravated by respira-

tion, frequent cough, and expectoration of white and very copious sputa. Getting better he left the hospital in the end of February, but returned again in the middle of March. At this time there were decided symptoms of pleurisy with effusion into the chest, and also of phthisis,—according to the indications of the stethoscope: the common symptoms were—hot dry skin, frequent pulse, quick short breathing, frequent cough, and expectoration (not very copious) of a frothy mucus intermixed with sputa of a yellow colour and opaque.

The same symptoms continued, with increase of emaciation and cough in June and July. In August, diarrhœa supervened, with increase of cough and fetid purulent expectoration, to the amount, for a short time, of a pound and half in the twenty-four hours. In October, there was again copious fetid expectoration, with dyspnœa and much cough, and inability to lie on the right side. At this time both sides yielded the same sound on percussion, but respiration could be perceived in the right side only. Fluctuation in the left side was also perceptible on succussion, by means of the cylinder, but not without it. The patient said that a momentary attempt to lie on the right side increased the frequency of the cough and greatly augmented the expectoration. He was not, however, sensible of any fluctuation in the chest. He died in the beginning of November.

On examination after death, the left side of the thorax was found larger than the right; the left intercostal spaces were wider and raised to a level with the ribs, while the right were sunk below that

level. On puncturing the thorax on the left side, an extremely fetid gas made its escape with a hissing sound. On laying it open it was found to contain about three pints of a blackish-grey liquid, extremely fetid, and having somewhat of the smell of garlick. The lungs on this side were compressed against the spine, and were not larger than the hand. Their surface was covered with a layer of a half-concrete white matter, intermixed with a very soft black substance. On it there were two openings of the size of the finger, which terminated, interiorly, in the substance of the lungs, in culs-de-sac not communicating with the bronchia. They were evidently the remains of tubercular excavations which had discharged their contents into the cavity of the pleura. The whole of the false membrane which invested the pleura was black and soft, on the surface, but below this is was firmer and whitish.

The right lung adhered to the pleura throughout by old attachments, and contained, internally, a great number of miliary tubercles. In its upper lobe there was an empty excavation, of the size of a filbert, and lined by a well-organised semi-cartilaginous membrane. In the middle of the same lobe there were found several white bands resembling antient cicatrices. (See Chap. I. sect. 2.) Two of these united in the form of the letter V, and contained between them a mass of tuberculous matter.*

Case 37. A man, aged 29, caught a severe catarrh from exposure to much cold in the beginning

* This case affords another proof of the cicatrization of tuberculous cavities, and also of their conversion into fistulæ.

of October, which he neglected, as he had done a cough with which he had been affected in the preceding spring. This catarrh, after a few weeks, was followed by spitting of blood for several days, and, subsequently, by a continual cough, dyspnœa and emaciation. In the beginning of February he came into hospital. At this time he was evidently in a confirmed consumption—being affected with great emaciation, frequent cough, yellow opaque sputa, dyspnœa, diarrhœa, *pectoriloquism.* Things continued much in the same way until the seventeenth, when the supervention of more febrile symptoms indicated a slight peripneumony. On applying the cylinder, it was found that respiration was not at all audible on the anterior and lateral portions of the left side of the chest; while *percussion* gave a much distincter sound than on the right side; and *succussion* of the trunk produced the characteristic noise of fluctuation. From all these circumstances, being convinced of the existence of both air and pus in the cavity of the pleura, and seeing no other means of alleviating the patient, I proposed the operation of empyema. This, however, was not performed, as he died the same day, although at the hour of the visit there did not seem any thing indicative of so sudden a termination of his disease.

On examining the body after death, the left side of the chest appeared to me evidently enlarged; but this was doubted by some of the persons present. On percussion it certainly yielded a much clearer sound than the other, and succussion of the trunk produced the noise of fluctuation.

On puncturing the thorax with a scalpel on the left side, a nearly inodorous gas continued to escape, with a hissing noise, for nearly a minute; and, on opening it, it was found three-fourths empty, the lung being found only of one-third its natural size, and compressed towards the mediastinum, but without adhering to it. In the same cavity there was scarcely a pound of a liquid resembling whey, of a whitish colour, turbid, and containing portions of yellowish half-concrete albumen. The whole of the lung, on this side, was covered with an irregular albuminous membrane, which in several places greatly resembled an omentum moderately loaded with fat. In the top of the superior lobe there were two excavations, containing only a little soft tuberculous pus, and each capable of containing a walnut. Both these were lined by a double membrane, and communicated with bronchial tubes. The whole lung was filled by tubercles in every stage. The upper lobe of the right lung adhered to the pleura, and contained a series of large tuberculous excavations, partly empty, and all lined by the semi-cartilaginous membrane. This lobe further contained many immature tubercles: the other lobes were sound.

Case 38. A man, aged 22, became affected, in the beginning of October, with a severe catarrh, which he attributed to drinking cold water while hot. This was followed by a constant cough and considerable hæmoptysis. He went into an hospital at the end of two months, and after remaining there a fortnight and being bled, his cough having become somewhat better, he left it. Having had a fresh attack ten

days thereafter, he came into the hospital under my care. At this time he was affected with prostration of strength, impeded respiration, frequent cough with viscid, frothy, and somewhat adhesive expectoration, and acute pain in the whole right side of the chest. Respiration was perfect over the whole of the left side, but was not perceptible on the right, except under the clavicle. Being considered as affected with pleuro-peripneumony of the right side, he was bled and put on proper regimen. After a continuation of this treatment the pain of the side disappeared, and the respiration became freer, but the patient did not recover strength, and he was, further, attacked with diarrhœa. Suspecting the existence of tubercles I examined him with the stethoscope, and detected pectoriloquism about the right shoulder-blade. I further found at this time that the respiration continued to be very indistinct in the right side, while percussion elicited from it a much clearer sound than from the left. This fact, and the additional sign of the *metallick tinkling*, convinced me of the existence both of pleuritic effusion and effused air (having a communication with the bronchia) in the right side of the chest. This was further confirmed by the noise of fluctuation produced by the hippocratic succussion. There was, at this time, no appearance of œdema on the right side; the intercostal spaces were not at all enlarged; nor did the liver appear to be at all pressed downwards into the abdomen. However, as the patient had lost scarcely any flesh, and his strength seemed rather oppressed than exhausted, I entertained hopes

of saving him by the operation of empyema. Immediately after this determination, the patient expectorated a very great quantity of a very fetid pus quite different from his usual sputa; and this was followed by increased difficulty of respiration, and other symptoms indicating a recent peripneumonic attack on the left side.

The operation was then performed, the incision being made between the fifth and sixth ribs (counting from above), about their middle; but no matter flowed, although the passage of air by the wound during respiration proved the penetration of the chest by the incision. Shortly afterwards he again expectorated a large quantity of very fetid pus, and died four hours after the operation.

On examining the body after death, the right side of the thorax appeared somewhat smaller than the left.* Succussion of the body produced the sound of fluctuation, but less distinctly than before death. On puncturing the right side of the chest, near the junction of the third rib with its cartilage, a large quantity of extremely fetid gas made its escape; and, on making a puncture about the middle of the fourth intercostal space, a very great quantity of pus flowed out, very liquid, of a slightly greenish yellow colour, and of an intolerable gangrenous fetor. The whole of the fluid contained in this cavity of the chest amounted to about a pint and half. The lung was much flattened towards the mediastinum, being only an inch thick at its superior part; it gradually

* This is contrary to the usual state of things in Hydrothorax and Empyema. In the present case it was the consequence of an anterior attack of pleurisy.

enlarged downwards, and at its inferior margin was two inches and a half in width. The lung had thus three sides;—the one internal, attached by means of short cellular adhesions to the mediastinum; the other anterior, of a triangular shape, and attached by old cellular adhesions to the sterno-costal pleura; and the third external, separated from the ribs by a space, nearly four fingers' breadth wide, which formed the inner wall of the excavation which had contained the effusion. This excavation (of which the ribs and diaphragm formed the remaining boundaries) was completely lined by a false membrane, of a degree of consistence intermediate between that of boiled white of egg and cartilage, of a pretty uniform thickness of from a line to a line and half, and of a pearl-grey colour, and semi-transparent. It seemed composed of two layers, the under being firmer than the upper. About the middle of the fourth rib this membrane was pierced by a small ulcer of the size of the nail, which extended to the rib, and had all the characters of one produced by the detachment of a gangrenous eschar. A somewhat similar ulceration, but extending only through the false membrane and subjacent pleura, was perceptible on the external side of the compressed lung. It had the gangrenous fetor, and was, obviously, an example of the partial gangrene of the pleura and false membranes. On the same exterior border of the compressed lung, at its posterior margin, there were two more openings, which were found to communicate with two large tuberculous excavations in the substance of the lung partly filled with purulent matter.

On blowing into the trachea, air made its escape into the cavity of the chest, into which these fistulæ opened, yet we could not detect the exact medium of communication with the bronchia. The substance of the lung, though flaccid, was still crepitous, and contained some tubercles. Upon removing the lungs it was evident that this side of the chest was much shorter than natural. The diaphragm was found intimately adhering anteriorly to the seventh rib, through two-thirds of its length, the adhesion sloping backwards to the ninth rib, so as to leave on the lower and posterior part of the chest, a species of cul-de-sac, not more than two fingers' breadth wide. This state of parts accounted for the result of the operation. The incision had penetrated through the diaphragm into the cavity of the abdomen, parallel with the upper surface of the liver.

The left lung was of the natural size, and contained, in its upper lobe, a cicatrice of the kind described in Book I, Chap. I, about an inch in length, as wide as the finger, and of the thickness of two lines in its centre. Around this cicatrice the pulmonary tissue was quite sound and crepitous. A little lower, and also in the superior and posterior part of the same lobe, it was indurated to the degree of hepatization, and was granular when cut into. The remainder of the lung was crepitous, but much redder than the right lung, and gorged with a bloody serum. It contained some small tuberculous masses like the right lung. The liver was quite sound, and entirely concealed beneath the false ribs. Between it and the diaphragm passed the incision made in operating.

The failure of the operation in the above case was inevitable: the same thing would have happened if the incision had been made three inches further back; and still more certainly had it been made in *the place of election.* I am not aware that this operation has before been frustrated by a similar obstacle. I apprehend so close an adhesion of the diaphragm to the pleura of the ribs must be very rare. In the present case I conceive it must be attributed to a pleurisy long anterior to that which caused the death of the patient. I have met with cases where the liver ascended as high as the fifth rib, and where the diaphragm lay in juxta-position with the pleura, all the way from its natural attachments to this point, without there being any disease of the lungs or pleura. In such cases an attack of pleurisy must have produced the extensive adhesion described in the last case.

For this and several other reasons, we ought to change the usual place of operating for empyema. To make the present place of operation the most depending, as it is said to be, we must have our patient in the upright posture; but the natural posture for a person affected with an effusion into the thorax, is that of lying on the affected side. In this position the most depending point is the middle of the space comprised between the fourth and seventh ribs.

On the other hand, experience proves to us—1st, that the upper part of the lungs adheres more frequently to the parietes of the thorax than any other part; 2nd, that the inferior part of these organs

adheres very frequently to the diaphragm; 3rd, that, in cases of effusion consisting partly of albuminous concretions and sero-purulent fluids, the thickest portions of the false membranes are accumulated in the vicinity of the diaphragm and adjoining parts of the thoracic parietes; and, 4th, that the middle and lateral part of the chest is that in which the greater portion of the effused fluids is accumulated. For these reasons I am of opinion that the place for performing the operation of empyema ought to be the middle of the space between the fourth and fifth rib, counting from above. With regard to the operation itself, I am of opinion that it is one of much less severity that is usually imagined. Its success depends less on the condition of the pleura, than on that of the lungs; and when this viscus is not too deeply affected by numerous tubercles, or by a large gangrenous eschar, it ought almost always to succeed. The admission of air into the cavity of the pleura is probably, also, less dangerous than is commonly believed. This is, indeed, proved by the cases of wounds of the thorax, and the history of recoveries after the operation of empyema.

I have not met with any example of acute inflammation of the pleura supervening to the operation; and I am not even sure whether the supervention of such an inflammation might not be the means of a speedy and certain cure of the disease, by producing an union between the lungs and ribs. At all events, in cases where the severity of the symptoms presented little hope of a cure from the operation, some benefit, and no danger, might result from simply

puncturing the chest. Perhaps, even, it might be useful to draw off the fluids in this manner in all cases of chronic pleurisy, repeating, if necessary, the puncture, five or six times. This slight operation would be attended with no inconvenience, and the puncture will heal up immediately. Morand, in one of the cases already cited by me, made two punctures of this sort, after which he performed the operation of empyema and effected a complete cure.

CHAP II.

OF HYDROTHORAX.

SECTION FIRST.

Of Idiopathic Hydrothorax.

This disease is very generally considered as one of very frequent occurrence, and as a common cause of death. This, however, is far from being the case. Instances of death from idiopathic Hydrothorax I consider to be as rare as one in two thousand. Many diseases are often ranged under this, which however are entirely different,—for instance—diseases of the heart and great vessels, irregular consumptions, and even schirrus of the stomach and liver.

One circumstance which has more especially led to the belief of the frequency of this disease, is the

common mistake of taking a sero-purulent effusion for it. This has arisen from the transparency of a part of these effusions. Indeed, it is only within these few years that the nature of the pleuritic effusion has been properly known; and the mistake we have mentioned has been made by men of great eminence at no very remote period. For example, Morand gives under the name of *dropsy of the chest,* a case of pleurisy cured by the operation of empyema.*

Idiopathic hydrothorax commonly exists only on one side. Its anatomical characters are simply an accumulation of serum in the cavity of the pleura; this membrane being quite healthy in other respects; and the lung being compressed towards the mediastinum, flaccid, and destitute of air, as in cases of pleuritic effusion. When the effusion is very great, the affected side is evidently larger than the other. This disease may exist in a very great degree without any other symptom of dropsy in any other part of the body.

The chief, and almost the only symptom of this disease is the impeded respiration: its progress, and the state of the general symptoms, can alone distinguish it from chronic pleurisy.

There are cases, even, where the distinction between these two diseases is difficult in the dead body. Whatever may be the difference, both in the general symptoms and the organic lesion, between a case of hydrothorax and an acute pleurisy; or between a case of ascites from general debility or organic

* Mem. de l'Acad. de Chir. tom. ii.

disease of the heart or liver, and the same disease from an attack of peritonitis;—or, in short, whatever may be the difference in general, between a dropsy and an inflammation,—there can be no doubt that these two affections, so opposite in their extreme degrees, are nevertheless often very nearly allied in their slighter shades. We frequently find albuminous concretions amid the serum of ascites, and purely serous effusions in inflammatory affections of the chest. These facts explain the admission made, by certain authors, of inflammatory dropsies, and the fact of blood-letting being occasionally beneficial in dropsy, and injurious in diseases truly inflammatory. This last is especially the case when the inflammation is of a chronic kind, or originates in a cause which is not within the controul of antiphlogistic treatment.

The *causes* of diseases are unfortunately, for the most part, beyond our reach, yet we learn from daily experience, that the particular character of these occasions greater differences among them (especially as regards their cure) than the *nature* of the disease itself. Many cases of pleurisy and peritonitis are equally untractable by venesection, as a bubo or venereal ulcer, or as the local inflammation of gout, or that which precedes hospital gangrene.

SECTION SECOND.

Of Symptomatic Hydrothorax.

Symptomatic hydrothorax is as frequent as the idiopathic is rare. The symptomatic dropsy may accompany almost every disease, acute or chronic, general or local; its presence almost always announces their approaching and fatal termination, and often precedes this only a few moments. It is not, perhaps, more frequent in cases of ascites and anasarca (leucophlegmatie) than in other diseases. It is most commonly met with in persons dead of acute fever, disease of the heart, or tubercles or cancer of different organs. Its symptoms, which are in every respect like those of the idiopathic disease, do not, in general, make their appearance but a few days, or even hours, before death. When the effusion takes place on both sides of the chest, it produces a very painful suffocation. Sometimes, however, we find a considerable effusion in both sides, in cases where there had been no very notable dyspnœa before death. Might not the effusion in such cases take place in the very moment of dissolution,—or even after death? We know that the functions of the capillary system do not cease immediately after death. The quantity of serum effused varies from a few ounces to one or two pints. It is commonly colourless or yellowish, sometimes tawny, reddish, or even bloody.

SECTION THIRD.

Of Symptomatic Hydrothorax, depending on the production of extraneous bodies in the Pleura.

There is another variety of symptomatic hydrothorax, which arises from organic affections of the pleura. These affections are cancerous tumours, or tubercles (such as affect the lungs) developed on its surface. The first are commonly of the variety called medullary or *soft cancer*, of varying size, but rarely bigger than an almond: they adhere strongly to the pleura, and have the usual characters of the variety of cancer to which they belong. They are commonly surrounded by a redness of the pleura to some distance, and this part, as well as their basis, is often intermixed with black striæ. They are rarely found in great numbers.

The tubercles that form on the surface of the pleura are generally very numerous, and vary in size from that of a millet to a hemp-seed. They are placed very close to each other, and are often united by means of a soft semi-transparent false membrane. Near the period of their development we can sometimes scrape off this false membrane, and with it the greater number of the tubercles, which are evidently rather developed in it than in the pleura itself. At a later period of the disease, the false membrane disappears, or, at least, is united and confounded with the pleura, which then seems thicker. In this

case the tubercles adhere very firmly to the pleura, and seem imbedded in its substance. Sometimes these tubercles are in their first stage, namely, semi-transparent, greyish, or almost colourless, and sometimes in the second, or opaque and yellow. I never met with any in the last stage, or softened. The interstices of these tubercles are often very red, and often contain distinct vessels. In this state the appearance of the pleura is analogous to that of the skin in certain cases of miliary eruption. We find, also, black striæ intermixed with the redness, which appear to be of the nature of melanosis.

We find also, occasionally, on the pleura, another variety of granulations which resemble some other cutaneous eruptions. This consists of small, white, opaque, flattened grains, placed very close together, and of a firm texture like that of fibrous membranes. This variety is also accompanied by thickening of the pleura. It appears to me to be the result of the imperfect organization of a false membrane, such as I have already described (page 147). These two varieties of morbid growths are very rare on the pleura, but very frequent on the peritoneum. Bichat is the first who noticed them, though he does not seem to have known the real nature of them: they are always accompanied by hydrothorax. The cancerous tumours mentioned are also generally, but not always, attended by the same disease. In all cases the effused serum is almost always red or bloody. The bony, cartilaginous, or fibro-cartilaginous incrustations developed in the pleura, or rather on its external surface, scarcely ever give rise

to hydrothorax, and, in all probability, produce little or no disorder in the functions of the part.

CHAP. III.

OF BLOOD EFFUSED INTO THE CAVITY OF THE PLEURA.

Penetrating wounds, or even a severe contusion of the chest, may produce an effusion of blood into the cavity of the pleura. The same thing takes place in certain cases of disease, and may follow the rupture of an aortic aneurism. In some cases, also, there is no doubt that a very copious exhalation of blood may take place spontaneously, without any solution of continuity or external violence. I do not here allude to those effusions which, as we have already seen, sometimes attend the formation of blood-vessels in the false membranes, or which confer on certain other effusions a sanguineous tint merely;—but to a primary and idiopathic effusion of blood analogous to the hæmorrhages, active or passive, of other organs. This case is doubtless very rare; yet some cases can bear no other explanation. These various cases constitute what has been improperly called sanguineous empyema. The most common of these is, unquestionably, that originating in the false membranes; and all those which I have seen become the subject of operation have

been of this kind. The most dangerous species is the spontaneous, inasmuch as, being usually the effect of a general hæmorrhagic diathesis, the removal of it, however effected, will, in all probability, be followed by a similar effusion in some other place. Blood effused in this manner may be absorbed as readily as in other situations; when this does not take place quickly, the blood is sometimes decomposed, and an aeriform fluid is disengaged, producing particular symptoms, as we shall see more particularly in a subsequent chapter.

CHAP IV.

OF ACCIDENTAL PRODUCTIONS AND OTHER SOLID BODIES IN THE CAVITY OF THE PLEURA.

SECTION FIRST.

The pleura, like all the serous, and even mucous membranes of the body, may be so altered in its nature as to secrete tuberculous or cancerous matter in place of its natural fluid. This matter may be formed in such quantity as completely to fill one of the cavities of the chest, compressing the lungs upon the spine. This is a very different case from that, already mentioned, of the development of tubercles on the surface of the pleura: in this latter case the

tuberculous matter is not secreted by the pleura, but originates in the false membranes of pleurisy. Such morbid productions as we are now considering are very rare. There is no well described case of the kind on record; but I apprehend those schirrous masses mentioned by authors as filling one of the thoracic cavities must be of the kind in question. Boerhaave appears to have found the medullary tumour, or soft cancer, in this situation in the person of the Marquis Saint Auban*; and Haller, as I have already observed, seems to have met with a large quantity of the matter of melanosis in the same cavity. In two instances I have myself discovered a considerable quantity of tuberculous matter in this situation. In both these, the matter was in different degrees of consistence. It was most solid at the bottom of the cavity, and over the whole of the surface of the pleura, on which it formed a layer of more than an inch thick: the remainder of the matter was quite soft, and was contained in the centre of this sort of sac. The following case, communicated to me by M. Cayol, is the third instance of the same kind.

Case 39. A negro child, 6 years of age, entered the children's hospital in 1807. Nothing respecting his previous history could be ascertained. He had a deep and painful ulcer on the temple, constant diarrhœa, frequent dry cough, unaccompanied by dyspnœa; he had irregular fever. He died, gradually exhausted, in less than a month.

On examination after death, the bones in the vici-

* See Zimmerman, Traité de l'Experience.

nity of the ulcer were found extensively diseased, and partly removed by caries. On the outside of the cranium there were two tubercles, one of the size of a large nut, and the other one-half less. They were not encysted, and were entirely composed of tuberculous matter in the first degree of softness. One of them was contained in a hollow on the surface of the cranium.

On opening the thorax the right lung seemed completely transformed into one tuberculous mass, but a more close inspection showed it to be compressed by this tuberculous growth, which was contained in, and completely filled, the cavity of the pleura. This matter was of the consistence of cheese, and exhibited no distinct tubercles. It was about the thickness of two fingers on the anterior and posterior parts of the lung, and somewhat thinner on the side. A portion of it, of the size of a walnut, had formed a passage outwards between the seventh and eighth ribs (which were carious), and adhered to the skin. This portion was as fluid as pus in its centre. Another portion united the diaphragm to the base of the lung, and also to the ninth and tenth ribs. On detaching this layer from the surface of the pleura, this, in place of being smooth, was found unequal, like the surface of the cysts of tubercles; and some very short fibres, like a fine cellular tissue, extended from it into the morbid production. In the midst of this mass the lung, compressed to one-fifth of its natural size, was found, in other respects, sound, and did not contain the slightest trace of tubercles. There was a small

quantity of serum in the left pleura, and also in the cavity of the peritoneum, and the liver was not quite sound. The mesentery, and other viscera, were in their natural condition.

Tumours of different kinds are also found developed between the pleura of the ribs and thoracic parietes. I have met with, in this situation, only the medullary tumour, tubercles of small size, and cartilaginous incrustations. Haller found, in this situation, an immense cyst, containing a serous fluid, and compressing the lung into the size of the hand.* M. Dupuytren found two enormous cysts of the same kind, in the body of a young man, who died of suffocation, after having long laboured under a progressively increasing dyspnœa. Each of these nearly filled one of the cavities of the chest, and compressed the lungs into a small compass on the anterior part of the cavity.† It is not improbable that these cysts were hydatids.

SECTION SECOND.

In cases of wound, some part of the abdominal viscera has passed into the thorax ‡. The same thing has followed a rupture of the diaphragm, occasioned by a fall, by great exertions ||, or by an enormous distension of the stomach §. The same derangement

* Opusc. Pathol. obs. xiv.

† Essais sur l'Anat. Path. par J. Cruveilhier. Paris, 1816.

‡ Vide Ambros. Paré—Leblanc—Fabric. de Hildan. Fanton.

|| Journ. de Desault, tom iii.—Richter on Herniæ.

§ Haller, Disput. Chir. tom, iii.

has taken place from original malformation of the diaphragm*; and even by the natural openings in that muscle†. On the other hand, a hernia has been formed by the lungs through the intercostal muscles. Grateloup has published a case of this kind, which was produced by violent coughing‡. Boerhaave records a similar instance arising from the exertions during labour‖; and Sabatier mentions another, supervening on the cicatrization of a bayonet-wound between the fifth and sixth ribs§. A fourth example is given in Richter's Journal (Bibliothèque de Chirurgie Allemande).**

CHAP. V.

OF AIR IN THE CAVITY OF THE CHEST, OR PNEUMO-THORAX.

Occasionally we find aeriform fluids in the cavity of the pleura. These are sometimes without smell, more commonly fetid, and of a fetor resembling that of sulphureted hydrogen gas. These fluids are sometimes in such quantity as very forcibly to compress the lung, and to distend the thoracic parietes in a very sensible manner. In this case the ribs are found more or less separated,—and the diaphragm

* Hist. de L'Acad. roy. des Scienc. 1729 & 1772; & Richter.
† Richter on Hernia,
‡ Journ. de Med tom. 53.
‖ De Haen Prelect. in Boerhaav.
§ Med. Oper. tom. 2.
** Tom. 3.

projecting into the cavity of the abdomen and forcing the viscera before it.

Although this affection cannot be said to be of excessive rarity, it has hitherto been but little noticed by medical men. All that we find respecting it in practical writers are a few examples of the disease very imperfectly described; and, in general, we know it merely from the casual observations of anatomists and surgeons, who have occasionally noticed the escape of air in opening the chest after death, or in performing the operation of empyema.* There exists no special memoir on this subject, to the best of my knowledge, but an inaugural dissertation of twenty pages, by M. Itard, at present physician to the institution for the deaf and dumb.† The disease is named by M. Itard, Pneumo-thorax. He details five cases of it, three of which are original, one extracted from Selle, and the fifth furnished by M. Bayle. In all these the aerial effusion co-existed with phthisis and chronic pleurisy. In all of them the lungs of the affected side were compressed into a small compass towards their roots. The fluid was more or less fetid. The cavity of the pleura was invested by a false puriform membrane, at least in the instances noticed with any degree of detail, and contained a few spoonfuls of pus. The author of this memoir, in conformity with the then established notions, considers the pneumo-thorax as an affection always consequent to and depending on a latent phthisis; and that its exciting cause is " the decay

* Vide Riolan, Enchirid. Anat. lib. iii. cap. ii.—Pouteau, Œuv. Post. t. 3.

† Dissertat. sur le Pneumo-thorax, &c. Paris, 1803.

of the lung by means of a chronic suppuration, together with the partial absorption and decomposition of the pus owing to its long stagnation in a confined cavity." We have already seen that this *consumption* of the lung *(pulmones assumpti,* LIEUTAUD) is not owing to the destruction of that viscus by suppuration, but that the collection of purulent matter is the cause and not the effect of the diminished size of the lungs. This fact, which I believe M. Corvisart was the first to demonstrate in his clinical instructions, is now considered as unquestionable by every one well acquainted with morbid anatomy. In former pages we have ourselves shown that the lungs may be reduced to a very small volume by purulent or watery effusions, without containing tubercles, or showing any mark of suppuration.

All the cases of M. Itard, then, are to be considered as pneumo-thorax consequent on a latent *pleurisy,* which co-existed with the phthisis, and in which the greater part of the effused liquid had been absorbed. It is sufficiently probable that, in these cases, the gas was the product of decomposition of some portion of the effused albuminous and puriform matter: the character of its smell leads to this opinion. This species of pneumo-thorax is pretty frequent. There are several other varieties sufficiently distinct. I have several times discovered this affection co-existing with a considerable sero-purulent effusion of the pleura, and a communication between this cavity and the bronchia, owing to the rupture of a vomica, or softened tubercle, simultaneously into the bronchia and pleura. I consider this species as the commonest of

all; at least, I have met with it most frequently. In this case it is reasonable to believe the air contained in the cavity of the pleura to be simply the atmospheric air conveyed thither by the bronchia. I shall subjoin several remarkable instances of this variety.

It is possible that, in this case, the introduction of the air into the pleura may excite inflammation of that membrane, and that, consequently, the pleurisy may be the effect of its presence, and not the cause, as in the instances given by M. Itard. It is, however, also possible, that a vomica may burst into this cavity without at the same time communicating with the bronchia, and may thus excite a pleurisy, and consequent pneumo-thorax, through the decomposition of the pleuritic fluids. This case comes under the head of those of M. Itard, with this difference, that the original effusion is here considerable.

Pneumo-thorax may also be conjoined with hydrothorax. I have not met with a case of this kind, but several cases prove its occurrence. It is, doubtless, true that many supposed cases of this kind have been true pleuritic effusions, mistaken for the simple serous exhalation; but M. Bayle gives one incontestible instance of this sort, in a person where there was found a small portion of serum and a great quantity of air in the pleura. (See his case 11).

Pneumo-thorax also almost always occurs when a gangrenous eschar of the lungs is dissolved and evacuated into the cavity of the pleura. In this case gas is evolved during the chemical decomposition of such matter; and this, together with the fluids

effused by the irritated pleura, compresses the lung, and dilates the affected side. We have already given two examples (cases 12 and 13) of this species of pneumo-thorax. Gangrene of the pleura, also, commonly produces the same effect. A case of this kind will be subjoined. The same effect results from the decomposition of blood effused into this cavity. On examining the body of a man that died after an illness of five days, Littre found in the chest two pints of blood, and an enormous quantity of air. This affection may, further, be produced by rupture of the pleura of the lungs from external violence. A case of this kind is mentioned by Hewson*. It is likewise probable that in the case of emphysema of the lungs, with rupture of some of the air cells and extravasation of air under the pleura, this membrane may sometimes be ruptured, and the disease in question be thus formed. I think I have seen something of this kind. Finally, an aeriform fluid may be formed in the cavity of the chest, without there being any solution of continuity, any other effusion, or any perceptible change of structure whatever. I have often perceived the escape of an inodorous gas, in opening the thorax, where there was no perceptible affection of the pleura. Sometimes, indeed, this membrane appeared to be drier than natural, and I remember one case in which it was, in some places, almost as dry as parchment. Even in these cases a rupture of the pleura, so slight as to be unperceived, may be imagined; but, independently of the circumstance that such rupture cannot well be

* Med. Obs. & Inq. vol. 3.

supposed without some external violence, we know that an idiopathic formation or secretion of air can and does take place in the animal system. It is thus that we sometimes find air, in considerable quantity, in the pericardium, in cases where there exists no other effusion in that cavity; we find the same, also, though more rarely, in the cavity of the peritoneum. It would even appear that air, or an aeriform fluid, exists naturally, in small quantity, in the cavity of the pleura. At least, M. Ribes assures me that he has found, in opening the serous cavities of dogs, a small quantity of air constantly to escape. This may probably, however, be merely the natural serous exhalation in a state of vapour. The following case will shew that air introduced into the cavity of the pleura, in the most simple and natural way—that is, by secretion—may not be productive always of a fatal, or even very severe pleurisy.

Case 40. A man, aged 65, of a strong constitution, subject for two years to a cough which did not prevent him from following his business, was suddenly seized one evening with violent pains in the abdomen and died the same night.

After death, the body, though emaciated, still retained considerable muscularity. The right side of the chest was evidently larger than the left, and yielded a louder sound on percussion than even the chest of a healthy person usually does. The left side yielded a sound comparatively obscure through its whole extent. There were found some diseased appearances in the brain. On penetrating by the scalpel the right cavity of the chest, an inodorous gas

escaped, and in large quantity, to judge by the force and duration of the sound occasioned by its exit. The lung on this side was somewhat compressed towards its roots, but still retained three fourths of its natural dimensions. This side of the chest was considerably dilated, and, besides the lung, might have contained about two pints of liquid,—the quantity, no doubt, of gas that had made its escape. The whole of the pleura was drier than usual, and rather unctuous than humid; there were no false membranes nor any effused fluid. The lung adhered to the costal pleura at its superior lobe, by means of cellular layers an inch in length, which seemed of no very antient date. This adhesion was attached at one end to a species of cartilaginous incrustation of the size of the palm of the hand, which adhered closely to the pleura pulmonalis. In detaching the cellular adhesions from this fibro-cartilaginous body, there remained in the centre of the latter, a small oval opening, about a line and half in diameter, which communicated with an excavation in the lung, which could have contained an orange. (I am not quite certain whether the oval opening, above mentioned, existed before, or was formed by the act of detaching the lung from its adhesions; though I am inclined to consider it as previously existing.) The excavation was nearly empty, containing only about a spoonful of pus. Its parietes were immediately formed by the pulmonary tissue, except in that space answering to the cartilaginous incrustation, where, to the extent of more than an inch square, they consisted solely of this false membrane. There were

many tubercles, in different stages, and also numerous hard melanotic tumours in different parts of the lung. The left lung adhered to the costal pleura in its whole extent. It, also, contained tubercles and melanotic tumours. There was, likewise, here a tuberculous cavity, of considerable size in the upper lobe. There was disease in the large intestines.

Whatever may be our opinion respecting the source of the air existing in this case, in the cavity of the pleura, the appearances prove that air may exist there without exciting much inflammation. The case further shows, that phthisis may pass through all its stages without producing any violent symptom; and I am disposed to believe, from the appearances observed, that this patient would have been either completely, or, at least temporarily, cured of this disease, had he not been carried off by another.

It is extremely probable, as Hewson,* and M. Rullier† have supposed, that pneumo-thorax offers the best chance of success for the operation of empyema. This opinion is supported by the declaration of Riolan, who tells us that he saw the operation several times performed for supposed dropsies of the chest, in which air alone, in place of water, made its escape with a sort of explosion.‡

In many cases already detailed in this work, (see cases 14, 34, 35, 36, 37, 38,) the existence of pneumo-thorax was recognized during the life of the

* Med. Obs. † Dict. des Sc. med. Art. Empyeme.
‡ Enchirid. Anat.

patient, and the following is an additional instance of the same kind.

Case 41. A woman, aged 26, of a feeble frame, came into hospital affected with what she called *a cold* of three months standing. Within the last month only, had she lost her appetite, or been unable to work at her business. She had, for several years, had the lymphatic glands in the axilla enlarged. When this woman came into hospital she was evidently in a state of hopeless consumption. The greater part of the chest yielded a pretty good sound on percussion, except on the left superior part, in which situation the stethoscope gave indication of the existence of tuberculous excavations. This patient survived two months. The day before her death, the stethoscope applied to the left side conveyed the *metallic sound*, characteristic of the existence of a cavity containing both air and liquid, and communicating with the bronchia (see Part II), while respiration was scarcely perceptible in any part of it. The same side sounded much better on percussion than the right, in which the respiratory murmur was very distinct. Convinced by these symptoms of the existence of a pneumo-thorax combined with a pleuritic effusion, I confidently expected that the Hippocratic succussion of the chest would let us hear the fluctuation of the liquid, and I was not mistaken. The patient died the night following.

On opening the chest a great quantity of an inodorous gas made its escape from the left side, which appeared half empty, the lung being compressed

upwards and backwards to one-third of its natural size. The surface of the pleura was partially marked by a punctuated redness, and its cavity contained about half a pint of a transparent, yellowish liquid, mixed with a few whitish flocculi. Almost the whole of the superior lobe adhered to the costal pleura; and, on the outer side, there was an opening or ulceration, of the size of the nail, covered with a thick yellow matter, and discharging bubbles of air on pressure being applied above it. This proved to be the outlet of a short fistulous canal, capable of admitting the finger, which communicated with a vast internal cavity, which occupied a great portion of the lobe. This excavation was irregular, and was lined by a very soft false membrane. It was nearly empty, and two or three bronchial tubes of the size of a crow-quill opened into it. In short, it resembled a true tuberculous excavation—such as have been described in Book I. Chap. I.

The right lung filled the cavity of the pleura and closely adhered to it, in almost its whole extent, by a short well organized cellular tissue. It was filled with white tubercles of the size of a cherry-stone.

Book Third.

OF THE HEART AND ITS APPENDAGES.

CHAP. I.

OF DISEASES OF THE HEART.

SECTION FIRST.

Of Hypertrophia, or simple enlargement of the Heart.

By Hypertrophia I mean simple encrease of the muscular substance of the heart, without a proportionate dilatation of its cavities, or even with a diminution of these. This affection is by no means common, and appears to have escaped the notice of M. Corvisart, as, through his whole work, he seems to consider enlargement of the parietes of the heart, as being uniformly accompanied by a proportionate dilatation of the cavities of that organ.

This enlargement of the heart is always attended by a considerable encrease of its consistence, except when conjoined with another affection of this organ, to be noticed presently, viz: *softening of the heart.*

Hypertrophia may exist in one or both ventricles, with or without a similar affection of the auricles. Most commonly the auricles are not affected, but occasionally they are so, while the ventricles are sound.

When affecting the left ventricle, I have seen its parietes more than an inch thick at the base, that is, double that of its sound state. Commonly, this morbid thickening diminishes insensibly from the base to the apex of the ventricle, where it is scarcely perceptible; sometimes, however, the apex partakes in the enlargement; as I have seen it from two to four lines thick, which is double or quadruple the natural size. The columnæ carneæ of the ventricle and of the valves acquire a proportionate enlargement. The septum between the two ventricles becomes also notably thickened in the disease of the left ventricle, (which fact seems to mark it as belonging to this rather than the other ventricle,) but never so much so as the other parts.

The muscular substance in these cases is of a degree of consistence sometimes double the natural, and is of a redder colour. The cavity of the ventricle appears to have lost in capacity what its parietes have gained in thickness. Sometimes I have found this so small, in hearts twice the size of the fist of the individual, as scarcely to be capable of containing an almond in its shell. The right ventricle, in such cases, is flattened along the septum, and does not extend to the apex of the heart. In extreme cases, it seems as if it were merely included within the parietes of the left ventricle.

In hypertrophia of the right ventricle the appearances are somewhat different. The thickening is here more uniform, and never so great as in the other: I have never found it greater than four or five lines. It is always a little greater in the vicinity of the tricuspid valves, and at the origin of the pulmonary artery. The columnæ carneæ are much enlarged, considerably more so, in proportion, than those in the left, in disease of that side. Simple enlargement of the right ventricle, without dilatation, is much rarer than that of the left. When this disease affects both ventricles at the same time, the only difference from the description just given is, that each side assists to form the apex of the heart.

SECTION SECOND.

Of Dilatation of the Ventricles.

This disease of the heart, which has been named *passive aneurism* by M. Corvisart, consists in dilatation of the cavities of the ventricles, with decreased thickness of their parietes. With these conditions there are commonly conjoined a notable degree of softening of the muscular substance, and a colour, either more violet, or paler, than natural. Sometimes the softness is so considerable, especially in the left ventricle, that the muscular substance can be destroyed by mere pressure between the fingers;

and the parietes of the same ventricle may be so much diminished in thickness, as to be only two lines in the thickest point, and scarcely half a line at the apex, while the right ventricle is sometimes so completely extenuated, as to appear merely composed of a little fat and its investing membrane. The columnæ carneæ, particularly of the left ventricle, are more remote than in the natural condition of the part. The septum between the ventricles loses less of its thickness and of its consistence than the rest of the parietes.

Dilatation may be confined to one ventricle, although it more commonly affects both at the same time. When one only is affected, the apex of it extends below the other, but not in so remarkable a degree as in the case of hypertrophia. The augmentation of the cavity seems to be more in its breadth than length. This is particularly observable when both the ventricles are dilated at the same time; as, in this case, the heart assumes a rounded shape, being nearly as wide at the apex as at the base.

SECTION THIRD.

Of Dilatation combined with Hypertrophia of the Ventricles.

This reunion, which constitutes the *active aneurism* of M. Corvisart, is extremely common; much more common than simple dilatation, and still more

so than simple thickening without dilatation. This complication may exist in one or both ventricles. In the latter case the heart acquires a prodigious size, sometimes more than triple that of the hand of the individual. As the augmentation of volume is here the effect of dilatation and thickening, the muscular substance acquires the great firmness already described. The apex of the heart becomes blunter, but this is rarely so great as to give to the organ the rounded form noticed in the case of simple dilatation.

Dilatation of one ventricle is sometimes conjoined with hypertrophia of the other, but this is not so common as the complication in individual ventricles. I have met with the following varieties of this complication: 1st, Hypertrophia with dilatation of the left ventricle, and simple dilatation of the right; 2nd, Hypertrophia with dilatation of the left ventricle, and simple hypertrophia of the right; 3rd, Hypertrophia with dilatation of the right, and simple dilatation of the left; 4th, Hypertrophia of the right, with dilatation of the left: this last is the rarest. I do not remember to have met with hypertrophia of the left ventricle (with or without dilatation) complicated with dilatation of the right. I would even be disposed to consider such an union as impossible.

SECTION FOURTH.

Dilatation of the Auricles.

Dilatation of the auricles is an extremely rare disease, and it appears still more so compared with the frequency of the same affection of the ventricles. Sometimes we find in subjects affected with hypertrophia or dilatation of the ventricles, the auricles, also, proportionably enlarged; it is, however, much more common to find these retaining their natural size even in cases where the ventricles are enormously enlarged. Sometimes also, but more rarely still, the auricles are dilated when the ventricles are of the natural size.

Before we can judge of the extent of this affection we must have precise ideas respecting the natural proportion of the various cavities of the heart. As far as the *cavities* are concerned, we must admit that they are very nearly of equal size; but as the parietes of the auricles are much thinner than those of the ventricles, the former, when simply full and not distended, compose only about one third of the whole organ,—in other words, the size of the auricles is about one half that of the ventricles. Both the auricles have the same capacity, although some anatomists have considered the right larger, no doubt misled by the greater length of its sinus, and more especially by the distended condition in which it is commonly found after death. A similar distension,

though more rarely, takes place also in the left auricle; and this accidental and temporary enlargement is sometimes so considerable, owing to the great extensibility of the auricular structure, as almost to equal the size of the ventricles. In order to distinguish the real from the factitious dilatation, we have only to empty the auricles through the vessels that enter into them, when, in the latter case, these cavities will immediately resume their natural size, and, in the former, they will still nearly retain their acquired volume. There is likewise another mark by which we can at once discriminate the enlargement produced by the accumulation of blood during the few last hours of life, from the permanent increase of capacity of the auricles. In the first case, the parietes of the auricle are greatly distended by the contained blood, and the colour of this appears through the thinnest portions; while, in the latter, the auricles, although very voluminous, are still capable of containing more blood, and their parietes remain opaque.

I have never met with decided dilatation of the auricles without some thickening of their walls; and, on the other hand, I have never seen thickening of their walls without an augmentation of their capacity. I may here remark that it requires much experience to judge correctly of hypertrophia of the auricles, as, owing to their great natural thinness, a considerable increase (say double the natural thickness, and the increase is rarely so much) is not obvious to a person little accustomed to such examinations.

The most common cause of dilatation of the left auricle is the contraction of the orifice between it and the ventricle, in consequence of cartilaginous or bony induration of the mitral valve, or of caruncles on its surface. The same causes sometimes occasion the retraction of this valve, and consequently the permanent patency of the auriculo-ventricular orifice. In this case dilatation and thickening may arise from the mere action of the ventricle on the auricle. I have never seen any change in the auricles without some alteration in the valves. Dilatation of the right auricle is most commonly the consequence of thickening of the right ventricle. The diseases of the lungs which M. Corvisart reckons among the ordinary causes of this dilatation, seem to me to produce, in general, merely the accidental distension above noticed.

SECTION FIFTH.

Partial Dilatation of the Heart.

M. Corvisart found, in the person of a young negro who died from suffocation, a partial dilatation of the left ventricle which was truly aneurismatical. "On the superior and lateral part of this ventricle there was a tumour almost as large as the heart itself.—The interior of this tumour contained several layers of coagulated blood, very dense, and exactly like those found in aneurisms of the limbs .... The

eavity of this tumour communicated with the ventricle by a small opening, smooth and polished." * A similar case is cited by M. Corvisart from the *Miscell. Nat. Curios.* I have myself never met with any thing of the kind.

There is another rare species of dilatation described by Morand, † a second case of which was communicated by me to the Soc. de la Facult. de Med. ‡ This is a dilatation formed in the middle of one of the lips of the mitral valve, resembling a thimble, or glove-finger projecting into the auricle.

There is still one other variety of partial dilatation of the heart, which I have several times met with, and which is probably, in a great measure, the result of original *malformation.* In the natural conformation of the heart, the right ventricle seems to consist of two distinct parts united together, the one of which descends towards the apex of the heart, while the other, almost at right angles to the former, is directed to the left side, and forwards towards the pulmonary artery. The dilatation to which I now allude, seemed to exist in both these divisions, while the point of union of the two retained its natural dimensions. It is, however, more common to find the anterior or pulmonary division of the ventricle dilated without the other portion; and in every case of dilatation of this ventricle, the former portion is always more dilated than the other. This difference becomes still more evident when the dilatation is conjoined with a certain degree of thickening, as, in

* Op. cit. p. 283. † Hist. de l'Acad. des Sc. 1729.
‡ Bulletin, No. 14.

this case, the pulmonary portion of the ventricle frequently acquires such a degree of firmness that its parietes do not collapse when laid open, a thing which hardly ever happens to the lower portion of the ventricle.

SECTION SIXTH.

Induration of the Heart.

I HAVE already observed that, in thickening of the heart, the muscular substance possesses an unusual degree of firmness and consistence. Corvisart has seen this so great, that the heart sounded like horn when struck, and the scalpel experienced great resistance in cutting it. However, the muscular substance of the heart "retained its natural colour, and did not appear to be converted either into the bony or cartilaginous tissue." I have never met with this species of induration, although M. Corvisart has several times. I consider it as the last degree of hypertrophia.

SECTION SEVENTH.

Softening of the Heart.

I HAVE already noticed this condition of the heart. In it the muscular substance is sometimes so soft

as to be almost friable, the fingers passing easily through the parietes of the ventricles. Whatever may have been the patient's disease, the heart is rarely filled with blood, and the ventricles equally collapse whatsoever may be their varying thickness. This affection of the heart is almost always attended by some change of colour in the organ. Sometimes this is deeper, and even quite violet; and this is particularly the case in fevers of the kind named *adynamique* by Pinel. More commonly, however, the softening of the heart is attended by a striking loss of colour, so as to resemble the palest dead leaf. This pale or yellowish tint does not always occupy the whole thickness of the heart; sometimes it is strongly marked in the central portions, and very little on the exterior or inferior surfaces. Frequently the left ventricle and interventricular septum exhibit this appearance, while the right ventricle retains its natural colour, and even a degree of firmness greater than natural. Again, we sometimes find here and there spots of the natural colour and consistence in hearts which are, every where else, much softened and quite yellowish. This variety of yellowish softening is particularly observable in those cases where dilatation is conjoined with a slight degree of thickening. It is also found in simple dilatation, although it is more common to find this state accompanied by that species of softening which is marked by an augmentation of the natural colour of the organ. There is a third variety of softening of the heart, which will be noticed in another place, and which is attended by a pale-white colour of the muscular

substance. In this, the degree of softening never reaches that of friableness; often it is scarcely perceptible; but the parts are flabby, and the parietes of the ventricles quite fall together on being opened. This condition will be noticed under the head of inflammation of the pericardium, as it is peculiar to that disease.

It would seem that the softening of the heart discovered in subjects whose death has been very gradual, is an acute affection; it is evidently still more so where it exists only partially in the substance of the organ. On the contrary, in cases where the heart is softened and yellowish throughout, it is probable that the affection has existed for a long time. The deep-coloured softness observed in subjects dead of fever, may, I think, be compared to that adhesive softness of the other muscles often observed in these cases, and which is also accompanied by a degree of redness greater than natural. This softening of the heart, as well as the anologous *gluey* or *fishy* (gluant ou poisseux) state of the muscles, is particularly observable in putrid fevers, particularly when these exhibit the phenomena formerly considered as marks of putridity—viz: livid intumescence of the face, softening of the lips, gums, and internal membrane of the mouth, black coating on the tongue and gums, earthy aspect of the skin, distended abdomen and very fetid dejections. I cannot assert that this softening of the heart exists in all kinds of continued fevers, but I have met with it constantly in such cases as I have attended to. Could it account for that frequency of pulse which

exists, sometimes for several weeks, in convalescence from fevers, although the patient continues to regain flesh and vigour?

SECTION EIGHTH.

Atrophy of the Heart.

It is an important question whether the heart be susceptible of diminution of size and power like other muscles; and, if so, whether this affords any hope of cure, by debilitating measures, in cases of hypertrophia. This much is certain, that, in cases where there is much emaciation, as in Phthisis and Cancer, the heart is generally found small. From this consideration, I have in many cases of hypertrophia attempted the method of cure proposed by Valsalva in aneurism. Almost all my patients got shortly tired of the extreme severity of the regimen, and alarmed by the frequency of the bleedings. In three cases, however, I have been so far successful that I am led to believe that this disease is not entirely beyond the resources of art and nature. Two of these were young women, the one 12 and the other 18 years of age, both of whom presented symptoms of hypertrophia in a high degree. The privation of one-half of their ordinary diet, and some occasional general and local bleedings effected the gradual diminution, and, eventually, the complete cessation of all their symptoms. The youngest has now been cured four years, and has

long ago returned to her usual regimen. The other still follows the prescribed regimen and is now quite reconciled to the diminished quantity of food. Blood-letting has not been found necessary for the last year, and the general symptoms of the disease have disappeared, although the unnatural thickness of the parietes of the heart is still recognizable by the stethoscope. The third case is still more conclusive, as I have been enabled to ascertain the state of the heart after death. I shall therefore state it more particularly.

Case 42. A woman, 50 years of age, had been affected for twelve years with all the symptoms of disease of the heart, in a very high degree, viz. strong and frequent palpitations, habitual dyspnœa, breathlessness on using the least exercise, sudden startings from sleep, almost constant œdema of the lower extremities, and lividity of the cheeks, nose, and lips. These symptoms had encreased during the last year, so that she could scarcely move from her chair without the feeling of suffocation. In this state I recommended the treatment of Valsalva, which she agreed to. I immediately reduced her aliments to one fourth of her former allowance, and bled her once a fortnight, either from the arm or by leeches. This mode of treatment gave immediate relief; and in the course of six months all the symptoms had disappeared; and, with the exception of debility (which however was not greater than it had been previously), she enjoyed a better state of health than for many years before. The respiration was now free, and the palpitations, œdema, startings, and lividity of the face

had quite disappeared. After this I recommended the bleedings to be decreased in frequency, and I dispensed with them altogether at the end of a year. She also returned gradually to her old regimen, only that now a much smaller quantity of food satisfied her appetite. She lived two years in a state of perfect health, when she was suddenly carried off by an epidemic Cholera. Upon examining the body after death I found the heart considerably less than the closed hand of the individual; being only about the usual size of that of a child 12 years old, although this woman was five feet three inches in height. The exterior of the heart resembled, in appearance, a withered apple, the wrinkles running longitudinally. The ventricular parietes were flaccid, but without any notable softening, and of the natural thickness. I am well aware that nothing can be deduced from a single case, but I have thought the above relation might be useful by stimulating others to prosecute this subject more at length.

SECTION NINTH.

Fatty Degeneration of the Heart.

In medical writings we find many examples of the heart being overloaded with fat in a surprising manner, and to which change of structure various symptoms, and even the sudden death of the individuals, were attributed. M. Corvisart thinks that an enor-

mous accumulation of fat around the heart may, in fact, produce such effects, although he has met with no similar, or other permanent derangement, in persons whose hearts were found to be much loaded in this manner. I have also met with a great many cases of hearts, overloaded in this manner, in subjects dead of various diseases. In these the fat was deposited between the muscular substance of the heart and the investing pericardium, and chiefly at the union of the auricles and ventricles, at the origin of the great vessels, and along the tract of the coronary arteries, also along the two edges and at the apex of the heart. Sometimes the posterior face of the right ventricle is covered by this deposition in its whole extent; a circumstance which rarely has place on the surface of the left ventricle.

The fatter the heart is, the thinner, in general, are its parietes. Sometimes these are extremely thin, especially at the apex of the ventricles and the posterior side of the right ventricle. On examining ventricles affected in this manner, they present the usual appearance internally; but on cutting into them from without, the scalpel seems to reach the cavity without encountering almost any muscular substance, the columnæ carneæ appearing merely as if bound together by the internal lining membrane. In these cases the fat does not appear to be the product of degeneration of the muscular fibres, as these can be separated by dissection. Sometimes, indeed, portions of fat penetrate deeply between the muscular fibres; but, even in this case, the distinction between the two tissues is still very marked, and

they are confounded by no mutual gradation of colour or consistence. It would seem probable from this, that, from pressure or some unknown aberration of the powers of nutrition, the muscular substance has wasted in proportion as the investing fat has encreased. It would seem reasonable to expect rupture of the heart from an affection of this kind; such an instance, however, has never occurred to me. Very commonly we find, in such subjects, a large quantity of fat in the lower part of the mediastinum, particularly between the pericardium and pleura. This fat, much reddened by its small vessels, and covered by its pleura, assumes the figure of a cock's comb and is firm. The fat surrounding the heart, on the contrary, is almost always of a pale yellow colour. I have not observed, any more than M. Corvisart, any symptoms that could directly denote the existence of an accumulation of this sort. I apprehend it must exist in a very great degree before it gave rise to any serious complaint. This is not, therefore, the condition I wish to denote by the name of *Fatty degeneration of the Heart.* This latter is an actual transformation of the muscular substance into a substance possessing most of the chemical and physical properties of fat. It is precisely similar to the fatty degeneration of the muscles observed by Haller *, and Vicq-d'Azyr †. I have only met with it in a small portion of the heart at one time, and only towards the apex. In these portions the natural red colour is superseded by a pale yellow like that of a dead leaf. This change of structure

* Opusc. Pathol. † Tom. v.

appears to proceed from without inwards. Near the internal surface of the ventricles, the muscular texture is still very distinguishable; more externally, it is less so; and still nearer the surface it becomes gradually confounded, both in colour and consistence, with the natural fat of the apex of the heart. In such cases, however, even the portions that still retain most of the muscular character, when compressed between two pieces of paper, still grease these very much. This character distinguishes this species of degeneration from simple softening of the viscus. I have never found rupture of the heart attributable to this change, any more than to the morbid accumulation of fat. It is denoted by no symptoms with which I am acquainted.

SECTION TENTH.

Cartilaginous or Bony induration of the muscular substance of the Heart.

I HAVE never met with ossification of the muscular substance of the heart, and only a small number of examples of this are on record. M. Corvisart found, in the case of a man who died of hypertrophia of the left ventricle, the whole apex of the heart, and more partially the columnæ carneæ, converted into cartilage (op. cit.).

Haller (Opusc. Pathol.) found, in a child, whose heart was of the natural size, the inferior part of the

right ventricle, the most muscular parts of the left auricle, and the sigmoid valves of the aorta and pulmonary artery, in a state of ossification. M. Renauldin has published, in the Journal de Med. for 1816, a very interesting case of the same kind. The patient was a man 33 years of age, much addicted to study, and subject to violent palpitations on the slightest motion. "On applying the hand to the region of the heart a sort of motion of the ribs was felt, and even the slightest pressure produced very acute pain, which lasted long after the pressure was discontinued. On examining the body after death the heart was found extremely hard and heavy. On attempting to cut the left ventricle great resistance was found, owing to the total conversion of the muscular fibre into a sort of *petrifaction*, having in some places a sandy character, in others a resemblance to saline chrystallization. The grains of this species of sand were very contiguous to each other, and became larger towards the interior of the ventricle. They were continuous with the columnæ carneæ, which were themselves converted into a similar substance, but still retained their original form, only much enlarged. Some of these sabulous concretions were of the size of the point of the little finger, and resembled small stalactites shooting in different directions. The ventricle was thickened. The right ventricle and great arterial trunks were sound. The temporal and maxillary arteries, and also a part of both the radial arteries, were ossified." We frequently find on the interior surface of the ventricles, especially the left, cartilaginous scales

continuous with the lining membrane, and apparently deposited between it and the muscular substance of the heart. These are generally small. I have never found them ossified.

SECTION ELEVENTH.

Of Carditis.

Inflammation of the heart is a rare affection, and is, consequently, very imperfectly known both in a practical and pathological view. There are two varieties of it, the general, or that affecting the whole heart; and the partial, or that confined to a small extent of it. There perhaps does not exist on record a satisfactory case of general inflammation of the heart, either acute or chronic. The greater number of cases so called, and particularly those given by M. Corvisart, are evidently instances of Pericarditis attended by that degree of discoloration of the heart which we shall find frequently to accompany that affection. Nothing proves that the paleness of the heart in such cases is the consequence of inflammation. This affection generally encreases both the redness and density of the parts which it occupies;—but the discoloration in the cases alluded to is conjoined, in general, with a perceptible softening of the heart. It is further observable that, in these cases, the pericardium was filled with pus, while not a particle was found in the substance of

the heart itself: now, pus must be considered as the most unequivocal indication of inflammation. The only case which I have met with of general inflammation of the heart possessing this unequivocal mark, is noticed by Meckel in the Mem. de l'Acad. de Berlin. But this case is described with so little precision, as merely to prove the possibility of the fact, and affords no help towards a general description of the disease.

Instances of partial inflammation of the heart, characterised by the presence of an abscess or ulcer in its parietes, are much more common. Bonetus has recorded a good many such cases in his *Sepulchretum*. I have only met with one instance of the kind. In this (in a child twelve years old) the abscess was situated in the parietes of the left ventricle, and might have contained a filbert: it was complicated with pericarditis. In another case, of a man 60 years old, I found an albuminous exudation, of the consistence of boiled white of egg, and of the colour of pus, deposited among the muscular fibres of the left ventricle. The patient had presented symptoms of an acute inflammation of some of the thoracic viscera, without precisely indicating its site. Orthopnœa, and a feeling of inexpressible anguish, had been the chief symptoms.

Ulcers of the heart have been still more frequently observed than abscess; they have been met with in its external and internal surface.* All the cases, however, recorded under this name are not quite correctly designated. In the *Sepulchretum* we fre-

* Morgagni, Epist. xxv.

quently find a case of pericarditis, attended with a rough and uneven pseudo-membranous exudation, mistaken for an ulcer of the exterior surface of the heart. This has been noticed by Morgagni (Epist. 20 and 25). That true ulcers of this surface, however, have been observed, is beyond doubt. A case of this kind is described by Olaus-Borrichius in the following words: "Cordis exterior caro, profundé exesa, in lacinias et villos carneos putrescentes abierat;* " and similar cases are recorded by Peyer † and Graetz. ‡ Ulcers on the internal surfaces of the heart are perhaps more common than on the external; or, at least, there are on record a greater number of incontestible examples of the former. Bonetus, Morgagni and Senac have collected a great many of these. I have myself only met with one case of this kind. The ulcer was on the internal surface of the left ventricle, and was an inch long by half an inch wide, and was more than four lines deep in its centre. This patient had laboured under hypertrophia of the left ventricle, which had been recognized before death: this was occasioned by rupture of the ventricle. This terrible and, fortunately, very rare accident, is almost always the result of ulceration of the ventricular parietes. Morand has collected several cases of this kind in the Mem. de l'Acad. des Sciences for the year 1732, and Morgagni has described a similar instance (Epist. 27).

Rupture of the heart from violent exertion, without previous ulceration, is much rarer still; and

* Sepulchret. Lib. II. obs. 86. † Ibid. sect. II, obs. 21.

‡ Disput. de Hydr. pericard. sect. 2.

the number of incontestible examples of this is very small. Several cases, recorded as such, are so imperfectly described, as to leave a doubt whether the alleged rupture might not have been rather the consequence of the incisions of an inexpert dissector. The best authenticated examples of this kind of rupture are those given by Haller (Elem. Physiol.), and Morgagni (Epist. 27).

It is surprising that the great thinness of the parietes of the ventricles, in the cases of accumulation of fat, does not give rise to rupture, more especially towards the apex and posterior part of the right ventricle. This is, however, so far from being the case, that ruptures of the right ventricle are much rarer than those of the left, and that, in this last, the rupture, when it occurs, is very rarely towards the apex.

M. Corvisart has given, for the first time, examples of another species of rupture of the heart, of a less certainly dangerous nature;—that, namely, of the tendons and fleshy pillars of the valves.*

In the three cases related by him the rupture appears to have been the consequence of violent efforts in lifting great weights, &c. A sudden and very intence feeling of suffocation was the immediate result of this accident, which terminated in exhibiting all the usual symptoms of disease of the heart. I shall have occasion to notice in a subsequent section a case of the same kind, only produced, apparently, by ulceration of the tendons.

* Corvisart on the Heart, obs. 33, 40, and 41.

SECTION TWELFTH.

Of Cartilaginous and Bony Induration of the Valves of the Heart.

The mitral and sigmoid valves of the aorta are subject to become the site of cartilaginous or bony productions, which encrease their thickness, alter their shape, and obstruct, sometimes almost totally, the orifices in which they are placed. The tricuspid and sigmoid valves of the pulmonary artery are much less subject to these alterations, although they are not quite exempt from them, as Bichat thought. Morgagni found (Epist. 37), in the case of an old woman, both these partially indurated. He likewise found, in a young woman, the sigmoid valves of the pulmonary artery agglutinated by means of a cartilaginous induration, partly ossified, so as considerably to diminish the diameter of the artery. M. Corvisart has twice met with a cartilaginous induration of the base of the tricuspid valve, and I have myself sometimes observed slight cartilaginous incrustations, both at the base, and on the points of this valve. I am not, however, aware that any one has found these indurated portions completely ossified; nor do I believe that the induration has ever been so considerable as to occasion a serious state of disease. For these reasons I shall confine my remarks to the valves of the left ventricle.

The cartilaginous induration of the mitral valve is sometimes confined to the fibrous bands found in its base. In this case it has the appearance of a very smooth, though unequal roll, lessening the orifice in which it is situated. This sometimes has the consistence of perfect cartilage, sometimes only that of imperfect cartilage. Similar incrustations sometimes are met with in other parts of these valves. The bony indurations present the same characters as to situation and inequality of thickness. Though formed in the interior of the valve, they often project from it quite uncovered. These ossifications are never perfect bone; they are whiter and more opaque, more fragile, and evidently contain a greater proportion of phosphat of lime. On this account they have been frequently named *stones* or *calculi*. In fact, they frequently bear a striking resemblance to small pieces of stone, of very irregular surface, recently broken. When they are situated in the floating extremities of the valve, these are sometimes united together, so as to reduce the orifice to a mere slit, which will, sometimes, scarcely admit the blade of a knife or a goose-quill. M. Corvisart found the orifice between the auricle and ventricle reduced to a channel three lines wide, and bent like the canalis caroticus, from the thickening of the ossified mitral valve. Sometimes, though rarely, the tendinous cords of the mitral valve are affected in the same manner; and M. Corvisart in one case found the whole of one of its pillars ossified.*

The ossification of the sigmoid valves of the aorta

* Op. cit. p. 212, 214.

may commence, like that of the mitral, in their base or their loose edges,—and much more frequently in one of these situations than in the intermediate portion. When in the loose extremity, the ossification seems most frequently to originate in the small tubercles known by the name of the *Corpora Sesamoidea.*

When the ossification is confined to the floating edge of the valves, or when the base though ossified is little thickened, the valve may still perform its functions, provided the middle portion of it be still sound. But when the ossification is extensive, the valves grow together, and get incurvated, either towards their concave or convex side, so as to acquire the appearance of certain shells. In this state they are immoveable, being either fixed on the side of the aorta, or in the orifice of the ventricle. Very frequently, of the three valves one is bent in a direction opposite that of the two others. In one case, M. Corvisart found all the three valves ossified in their closed position so as to leave merely an extremely small slit for the passage of the blood. The evil of this was partly obviated by one of the valves, although ossified and very thick, still retaining, at its base, sufficient mobility to allow an increase of one or two lines to the orifice during the action of the heart.

SECTION THIRTEENTH.

Of Accidental or Extraneous Productions in the Heart.

Of all the organs of the body the heart is perhaps the least liable to these productions, if we except ossifications. Twice only have I found tubercles in its muscular substance, and not once melanosis, medullary sarcoma, or any other species of cancer. M. Recamier, however, informs me that he has found the heart partially converted into a schirrous matter resembling lard, in a person who also had cancers in the lungs. In the *Sepulchretum* we find several examples of tumours in the heart, which appear to have been cancerous. Columbus found two hard tumours of the size of an egg in the parietes of the left ventricle.* Morgagni relates a case where there were numerous small tubercles on the external surface of the right auricle, in a subject which exhibited similar, but larger, tumours in the mediastinum, lungs, lymphatic glands, and cellular substance of the thorax and abdomen (Epist. 78).

Encysted serous tumours are equally rare in this viscus. When they do occur they are most commonly found between the muscular substance and investing pericardium. Examples have been recorded by Baillou, Houlier, Cordæus, Rolfinckius, Thebesius, Fanton, Valsalva, Morgagni, and Dupuytren. The

* De re Anat. lib. xv.

latter found cysts of this kind in the parietes of the right auricle, projecting inwardly and distending it to a size equal to the whole of the other parts of the heart. Morgagni describes a tumour, which was evidently a hydatid, implanted on the surface of the left ventricle (Epist. 21), and which appears to have been that variety named by Rudolphi *Cysticercus finnus.*

SECTION FOURTEENTH.

Of Polypi of the Heart.

It was formerly customary to attribute to the polypous concretions of the heart observed after death, the symptoms which truly depend on the enlargement of that organ. The incorrectness of this opinion is proved by the fact, that these concretions are very frequently found in persons who have never exhibited any symptom of disease of the heart: in truth, they are met with in three-fourths of dead bodies. It is equally erroneous to believe, with some modern authors, that polypi never begin to form until the moment of death. Many facts prove that these concretions can be formed during life. The phenomena of Aneurisms alone prove this. Haller found the carotid artery and internal jugular vein quite obstructed by very firm concrete fibrine in one case; and the inferior vena cava in another.*

* Opusc. Pathol. obs. 23, 24.

Vinckler,* Stancari and Bonaroli have met with similar cases.†

I have myself observed, in a consumptive subject, an obliteration of the inferior cava for the space of four fingers' breadth. This obstruction was produced by a whitish fibrinous concretion which filled the whole caliber of the vein. The exterior layers of this concretion were like the buffy coat of the blood, only much firmer, and adhered strongly to the inner coat of the vein; the inner portions were, on the contrary, of a yellowish colour, more completely opaque, and of a friable character like certain kinds of cheese. In another case I found a similar obstruction in the carotid artery; and, in a third, I observed the whole of the vessels of the pia mater, in a circumscribed space about the size of the palm of the hand, injected with a similar concretion. None of these individuals had exhibited any symptoms indicative of such an affection, nor did there exist in any of them any obstacles to the course of the blood which might account for them: we must, therefore, attribute them to spontaneous coagulation of the blood, and reasoning, a priori, therefore, nothing is more probable than that the blood may coagulate during life, in the heart also; at least at the very close of life, when the circulation is performed only in an irregular and imperfect manner. M. Corvisart was therefore correct in distinguishing polypi into such as are of a formation posterior to death, and such as have been produced while the individual was still alive. These two kinds are easily distinguished

* Dissert. de Vasor. lithias. † Morgagni, Epist. 64.

from each other. The former, or those of recent formation, exhibit merely a slight layer of whitish opaque fibrine partially enveloping the coagula of blood contained in the heart and large vessels. This fibrinous or buffy layer never completely surrounds the coagula, and does not adhere to the parietes of the heart or vessel in which it is contained. Sometimes this layer is thicker, and, in this case, especially if the subject is dropsical, it is semi-transparent and tremulous like jelly.

On the other hand, the polypi of more antient formation are of a much firmer consistence, and adhere more or less strongly to the parietes of the heart. In the ventricles and auricular sinuses, this adhesion is partly caused, no doubt, by the intertexture of the concretion with the columnæ carneæ: but, even here, the principal part of the attachment is independent of any mechanical structure of the parts. These concretions are of a more distinctly fibrinous texture than are the recent formations or the buffy coat of the blood, and they are, further, of a pale flesh or slight violet colour; while the more recent are, as already mentioned, of a white or yellowish colour.

These antient concretions are found most frequently in the sinus of the right auricle, and in the right ventricle. When in the former, they completely obstruct its cavity, but in the ventricle they only double in thickness its parietes (thereby lessening its cavity) and obstruct the descent of the tricuspid valve. In this case, one may remove all the loose coagulated blood without injuring the

concretion; it is even possible that this might be mistaken for the natural boundaries of the cavity.

The columnæ carneæ to which these concretions are attached, are commonly perceptibly flattened; a circumstance which, of itself, would prove their formation to be anterior to death. M. Corvisart was the first, as far as I know, to observe this flattening of the columnæ: in the case noticed by him they were quite *effaced*. I have not met with any case so strongly marked as this; but is is by no means rare to find cases wherein the thing is very perceptible.

There is still a third species of concretion, evidently more antient than those just described,—of a formation, perhaps, several months anterior to the patient's death. These are found adhering to the parietes of the heart, sometimes so firmly as only to be detached by scraping with the scalpel. Their consistence is less than that of those just noticed; being not at all fibrinous, and resembling rather a dry friable paste or a fat and somewhat soft cheese. They have lost the slight semi-transparency of recently concreted fibrine, and resemble in every respect those layers of decomposed fibrine met with in false aneurisms. I have only met with concretions of this kind in the auricles.

SECTION FIFTEENTH.

Of Excrescences on the Valves and internal Parietes of the Heart.

THERE are two very distinct varietes of this affection. The first has been described by M. Corvisart under the name of *Excrescences of the Valves;* the other, which does not appear to have been hitherto described, I shall notice under the name of *globular excrescence.* The first kind might very well be named warty excrescence, inasmuch as they are extremely like warts, especially those of venereal origin on the parts of generation. Like these, the excrescences in the heart sometimes resemble small cherries, in their form and tuberous surface; at other times they are elongated into the form of a small cylinder or cord, and, occasionally, they are so short and so crowded together, as merely to give to the parts on which they are situated a rough or rugged surface; more frequently, however, they are either isolated or ranged in a single line along the loose, or the attached border of the valves. I have never observed any longer than three lines. The colour of these excrescences is sometimes whitish like that of the valves, and hardly so opaque; more commonly they are either wholly or in part tinged with a reddish or light violet colour. Their texture is fleshy, like venereal warts, only of somewhat less

firm consistence. They adhere immediately to the subjacent parts; sometimes so strongly as to be only separable by incision; more commonly they are easily removed by scraping. The venereal origin of these excrescences, entertained by M. Corvisart, appears to me very improbable, when we consider their rarity and the frequency of venereal complaints, and when we meet with them, as we do, in individuals who, in all probability, never had this disease. Whatever may be the remote cause of these bodies, the manner of their formation seems to me more explicable. In dissecting the more voluminous excrescences, it has always appeared to me that their texture has borne a strong resemblance to that of the more compact polypous concretions. Frequently we observe in their centre a violet or sanguineous tint; and sometimes I have even found a very small, but distinct, coagulum of blood. From these circumstances I am led to believe, that these excrescences are merely polypi organised by the same process which transforms the false albuminous membranes into true adventitious membranes, or into cellular substance.

In like manner as M. Corvisart, I have only met with these excrescences in the following situations, viz. the mitral, tricuspid, and sigmoid valves, and (much more rarely) the interior of the auricles, especially the left. In general they are more common in the left than the right side of the heart. I may here remark that the view of the formation of these excrescences, given above, proves that they are not likely to occur but in subjects already affected with

some serious disease of the heart or large vessels; a circumstance, as we shall find, in another place, which must render their diagnosis very difficult. [In the following notice of a case of this affection, I shall, as in many of the former cases, omit several of the symptoms with the intention of again noticing them in another part of this work.]

Case 43. A man, aged 35, at the period of his coming into hospital, had been affected for five months with great dyspnœa and violent palpitations on making any considerable exertion, startings from sleep, and occasional spitting of blood. For a few days past he had laboured under a severe diarrhœa. His countenance was tranquil, with some colour, the pulse small, hard, and regular, and the respiration oppressed. The action of the heart was not quite regular, but there was no distension of the jugular veins. This patient died on the third day.

The pericardium contained half a pint of serum. The heart was double the size of the patient's fist. The right ventricle was very large, its parietes being at least four lines thick, and its columnæ very large. The tricuspid valves, and the sigmoid of the pulmonary artery, were of a deep violet red colour. The right auricle was sound. The left ventricle was one-third larger than natural, and its walls were six lines thick, and its columnæ very thick. One of the tendons affixed to the edge of the mitral valve was ruptured about its middle. This rupture appeared to have been the consequence of progressive wasting of its middle part; and one of the other tendons of the same valve was unequally extenuated, but still

whole. The whole floating border of the mitral valve was covered with small excrescences such as I have described, varying in size, form, and consistence. Altogether they gave to the valve a thickened and fringed appearance. The sigmoid valves of the aorta, and the lining membrane of this artery, were extremely red, and exhibited in this respect a striking contrast with the inner membrane of the ventricle. The whole inner surface, and indeed the whole parietes, of the left auricle, were of the same red colour; and, above the opening of the left pulmonary veins, and about two lines from the auriculo-ventricular opening, there was about an inch square coated with a congeries of excrescences similar to those on the mitral valve, and very firmly attached. The muscular substance of the heart was of moderate firmness. The pleura contained about a pint of serum on each side. The lungs were sound.

The *globular excrescences* have a quite different appearance from those just described, resembling little balls or cysts, of a spherical or oval shape, and of a size from that of a pea to a pigeon's egg.

The exterior surface of these is equal, smooth, and of a yellowish white colour, and the thickness of their parietes is very uniform, being never more than half a line. The substance composing their parietes is opaque and very similar to that of antient polypi, its consistence being firmer than boiled white of egg. The inner surface of these parietes (the cyst) is not so smooth as the exterior, and it appears to be composed of a softer substance, which occasionally has the appearance of passing gradually into the matter

contained within it. This matter may exist in three different states, all of which may be found in the same subject, but in different cysts. These are, 1st, a liquid resembling half-coagulated blood, only turbid as if intermixed with some insoluble powder, and sometimes containing a few clots of perfectly coagulated blood; 2nd, a more opaque matter, of a pale violet colour, of a pultaceous consistence, and very like the lees of wine; and 3rd, yellowish, opaque fluid, like thick pus or thin paste. I have only met with cysts of this kind in the ventricles and auricular sinuses. They are found as frequently in the right as left side of the heart, generally near the apex of the ventricles, and always adherent to the walls of the cavity. They are attached by means of a pedicle, which is often so slightly connected with the columnæ carneæ as to be detached from them without being ruptured. This pedicle, although forming part of the excrescence, resembles the common polypi more than the other portions, and seems as if it were of more recent formation and less perfectly organised. I have never found these bodies more organised than I have described, and I have considered those containing clots of blood as the newest, those containing a fluid like the lees of wine as next in order, and those containing a puriform matter as the most antient. I have met with these excrescences in subjects dead of different diseases, but all of whom had remained in a dying state (agonie) for several days or even weeks.

The only case that I have met with in medical writings, which seems to me to agree with the above

description, is recorded in the *Miscel. Natur. Curios.* The affection, nevertheless, does not appear to be extremely rare, as I have met with several cases of it.

SECTION SIXTEENTH.

Of the Red Colour of the internal Membrane of the Heart and large Vessels.

In examining dead bodies we frequently find the inside of the aorta and pulmonary artery uniformly reddened, as if stained by the blood they contained. This colouring is of two kinds,—either bordering on scarlet, or violet. The scarlet colour has its seat exclusively in the inner membrane, as, when this is removed, the tunic beneath is found of the natural colour. This colour is quite uniform, as if painted, without any trace of vascularity, only sometimes more intense in one place than another. Sometimes this stain diminishes progressively from the origin of the aorta, but frequently it terminates quite abruptly with irregular edges. Sometimes in the middle of a very red portion we find a circumscribed spot retaining the natural white colour, like the whiteness produced by pressure with the finger on an erysipelatous skin. The origin and arch of the aorta are the situations most commonly reddened, and, with them, the sigmoid and mitral valves. When the pulmonary artery is affected, its valves, as well as the tricuspid, are commonly in the same

state. The lining membrane of the ventricles and auricles is frequently colourless when the valves are deeply stained; not unfrequently, however, the auricle participates in the affection, but scarcely ever the ventricles. This redness is attended by no sensible thickening of the part, and it entirely disappears after a few hours' maceration.

M. Corvisart has slightly noticed this affection; and has avowed his ignorance of its nature and cause. Franck, who has observed it through the whole tract of the arteries, considered it as the cause of a particular and uniformly fatal fever. My own observations are far from leading to the same result, although I confess myself ignorant of the nature of this affection. The most natural idea respecting it is, that it is the result of inflammation. But mere redness, without thickening of parts, does not sufficiently characterise this state; while the abrupt termination, and exact circumscription presented by the redness in certain cases, seem not easily to accord with the nature of inflammation. On the other hand, it may, indeed, be said, that, in the serous and mucous membranes, this sort of redness by stains is more characteristic of inflammation than the mere sanguineous infarction of the capillaries, which might take place either at, or after, death. The following is an example of this affection.

Case 44. A young woman, fresh-coloured and plump, came into hospital complaining only of intense headach, of three days' duration. At the end of two days the disease assumed the appearance of acute hydrocephalus, the pulse being very slow, very

regular and of moderate strength. The cerebral symptoms increasing rapidly, this patient died at the end of ten days from the invasion of the disease, after the application of the usual measures, and particularly the employment of a great number of general and local bleedings indicated by the violence of the headach. For two days before death, the pulse became more frequent, but not stronger, nor more irregular. On examining the body, besides the hydrocephalus, there were found tubercles in the lungs, large tuberculous ulcerations in the intestines, extensive emphysema in several portions of the mucous coat of the intestines, unequivocal marks of confirmed lues, and, finally, a very intense redness of all the valves of the heart, the aorta, and particularly of the pulmonary artery.

One of my pupils informs me that he found in an aorta intensely reddened, some small purulent collections, resembling miliary pustules, situated between the internal and middle coats. This, however, must have been the consequence of disease of the middle coat itself, as we can hardly suppose that inflammation of the internal coat would terminate in suppuration of its adherent surface. I do not, however, mean to deny the possibility of the inflammation of blood-vessels. On the contrary, I think it probable that the affection we have been describing is of this nature; and I would be disposed to consider the various concretions of blood already mentioned, for example, those which produce obliteration of veins, and the warty excrescence, as the result of inflammation.

The second species of redness of the large vessels has a quite different appearance, being, in place of a bright red, of a violet hue. It is also usually extended at the same time to the aorta, pulmonary artery, valves, auricles and ventricles. This variety is not so exactly confined to the lining membrane, as we find the muscular substance of the auricles and ventricles, and even the fibrinous coat of the aorta and pulmonary artery, participating in it, at least partially. I have found this variety of colouring in subjects dead of putrid fevers, emphysema of the lungs, and disease of the heart. All these individuals had remained long in a moribund condition, with suffocation; and I have thought that the violet tint was deep in proportion to the intensity and duration of the latter symptom. From this circumstance I am disposed to consider this condition of the vessels as the effect of deranged circulation and congestion of the blood in the capillaries; being analogous to the livid hue of the cheeks, &c., observable in persons dead of disease of the heart. It is, in fact, an effect of death, or at most produced in articulo mortis.

I would here beg to observe, that it is often difficult to distinguish mere congestion of the capillaries from actual inflammation. The distinction, however, is of great importance both in morbid anatomy and practical medicine, the more so, as both these affections may exist simultaneously. In proof of this I may refer to the controversy that has for some time existed respecting the condition of the mucous membrane of the intestines in fever.

I am far from denying the influence of irritation, ulceration, aphthæ, and consequent inflammation of the intestinal tunics in continued fevers; and, although they have been more or less noticed and appreciated in all ages, M. Broussais has truly benefited his profession by calling the attention of practitioners more particularly to them, and by showing the injurious error of former periods in withholding the employment of general and local bleedings in fevers. But we should fall into as great, although an opposite, error, if we concluded that all continued fevers depended on the intestinal irritation that accompanied them, and that every kind of redness observable in them after death indicates a disorder requiring venesection for its treatment. The mucous membrane of the stomach and bowels is naturally pale only in persons of pale skins; its degree of colour may be judged of by that of the lips, mouth, anus and vulva, in different individuals. No one will set down the livid gums of a dropsical or scorbutic patient, or the swelling and blueness of his hands and feet, to inflammation, or think of treating these affections by blood letting. Now, in many cases, I conceive, the redness of the mucous coat of the intestines has much more relation to this passive congestion than to inflammation. If, then, such appearances (as is most probable) only took place in such subjects, at the same time as the lividity of the face and of the dependent parts of the body—that is to say, some days or hours before death; it would be absurd to look to such condition of parts for the cause of the fever,—more especially, as we often

find, in such cases, traces of as great or greater disorder in almost every texture of the body. For example:—the skin is dry and harsh; the lips, gums, and lining membrane of the mouth are swollen, soft and chopped; the membranes of the brain are gorged with blood and containing serum; the lungs are charged with a sero-sanguinolent fluid; the mucous membrane of the bronchia is swollen and of a violet hue; the heart is flaccid, livid and soft; the blood fluid and imperfectly coagulable; the lining membrane of the arteries or veins livid as if stained by blood; the muscles *fishy* (poisseux); the spleen enlarged; the capillaries of almost every organ, and of the surface, gorged with blood; and, lastly, the intestines are in the same state, and their lining membrane livid, ulcerated and thickened in diverse places.—Now, to which of these affections shall we attribute the disease? All are posterior—often many days—to the fever. Is it not, therefore, more rational to consider, that none of these local lesions are the cause, but that, as in small pox and measles, some unknown cause, acting generally on the system, has produced both the fever and the local affections—whether active or passive—which accompany or follow it?

In the very case where there exist simultaneously aphthæ and exulcerations in the intestinal tunics, and redness, lividity, and capillary congestion of the mucous membrane, we ought to conclude, from analogy, that the two former states are the result of inflammation, active or passive,—and the three latter the result of debility of the circulation in

the capillaries; that the first may require venesection, but that this very means, carried to too great lengths, may give rise to, or increase the last, by increasing the general debility. The hæmatemesis and bloody fluxes which occur sometimes in continued fevers ought rather, in my opinion, to be attributed to purely passive congestions of the capillaries, than to inflammation. In the instances just mentioned we find the whole of the intestinal tunics in the affected part tinged with blood, and softened, without any notable increase of thickness of the part; while inflammation of every mucous membrane uniformly increases both the thickness and density of the part. We may farther add the fine observation of Bichat, that, of any morbid affection, inflammation has the least tendency to propagate itself by contiguity, especially in membranous parts. Peritonitis and dysentery leave untouched the muscular coat of the intestine, but the lividity consequent on fatal fevers often extends to the whole three tunics.

SECTION SEVENTEENTH.

Of Malformation of the Heart.

There exist two varieties of unnatural communication between the cavities of the heart, viz. the perforation of the septum of the ventricles, and the continued patency of the foramen of Botallus. The first variety is very rare, there being not more than

five or six instances of it on record. In all these the unnatural aperture was smooth, evidently very ancient, if not congenital. The continued patency of the foramen of Botallus is much more common. Sometimes this is produced by the imperfect union of the two plates of the fœtal valve, so that a probe, or even a female sound, can be passed obliquely from one auricle to the other. This condition of parts is not very rare, and does not appear to be productive of any kind of inconvenience. In other cases we find the foramen continue constantly open so as to admit the finger. I have myself seen it sufficiently large to receive the thumb. It is commonly believed that this species of malformation is always congenital; but from some cases which I have met with, I am disposed to believe that such a perforation may be produced by an accident; or, at least, when such a condition of parts exists as above described, that a blow, fall, or violent exertion, may cause the dilatation of the oblique opening, and its progressive enlargement. The history of several cases on record, especially of some of M. Corvisart's, would seem to countenance this opinion, since, in several of these, the individuals had enjoyed good health, without any symptom of diseased heart, until they had experienced some of the accidental causes above-mentioned.

I do not know that any of these unnatural communications have existed without consequent thickening and dilatation of either the whole, or part of the heart, especially the right side. The symptoms of the latter affection are, consequently, combined

with those of the former. These are principally the four following: 1, a great sensibility to the impression of cold; 2, frequent faintings; 3, the respiration more constantly impeded than in most other diseases of the heart; and 4, a violet or blueish colour of the skin much more extensive than in any other disease, and, sometimes, even general. This last symptom has been named by several authors *the blue jaundice*, or *the blue disease*. On the other hand, all the above-mentioned symptoms have been found to exist in subjects who had no other malformation than the continued patency of the foramen of Botallus; and still more so in those cases where the pulmonary artery was found to originate in the left ventricle, and the aorta in the right, or where the latter has opened at once into both ventricles. In some diseases of the lungs, especially emphysema, the blue colour of the skin is sometimes quite as intense and as extensive as in the case of malformation of the heart. On the other hand, the foramen of Botallus has been found dilated very considerably, without there being present any degree of lividity except on the face and extremities. The case of dilatation noticed by myself, above mentioned, was of this sort.

SECTION EIGHTEENTH.

Of Displacement of the Heart.

The heart, although retained in its place by the diaphragm, large vessels, and peculiar structure of

the mediastinum, and, still more, by the constant state of plenitude of the chest, may, nevertheless, in certain cases, be thrown to the right or left by a solid, liquid, or aeriform effusion into either sac of the pleura, by extensive tumours in the lungs, and, as we have already seen (page 87), by emphysema of this organ. In like manner, a tumour in the superior mediastinum, or a large aneurism of the arch of the aorta, may press it downwards, so that that part of the diaphragm on which it reposes shall project into the abdomen. Sometimes even this depression has taken place without any visible cause, in which case the affection has been named by some authors *prolapsus* of the heart.

These various kinds of displacement produce no perceptible inconvenience when they exist in a slight degree; when more marked, they may produce bad effects; but in this case, they are themselves consequences of lesions much more serious.

SECTION NINETEENTH.

Changes produced by Diseases of the Heart in the texture of other Organs.

On examining the bodies of persons who have fallen victims to organic affections of the heart, besides the organic lesion and the serous effusions which almost always accompany it, we find all the marks of congestion of blood in the internal capilla-

ries. The mucous membranes, especially those of the stomach and intestines, are of a red or violet tint; and the liver, lungs, and capillaries situated beneath the serous mucous and cutaneous tissues, are gorged with blood. The augmented colour of the mucous membranes varies much in degree and extent. Sometimes it is observed only here and there, under the form of small points or specks, disseminated over the surface of the membrane: at other times it occupies the whole extent of the surface, and has the appearance of being attended by some swelling of the part. These two latter appearances are sometimes so considerable, that, if we looked to them merely, without examining the condition of the heart, and without reference to the history of the patient, (who had been found capable of taking into his stomach wine and other stimulant matters without experiencing any pain, even up to the period of his death,) we might be tempted to believe that the fatal disease had been a violent inflammation of the stomach and bowels. In fact, the degree of redness of these membranes observed after diseases of the heart, is often much more intense and extensive than is found after true inflammation of these parts, as, for example, in dysentery; a fact, among many others, sufficiently proving the insufficiency of mere redness to characterise inflammation of the mucous membrane of the intestines.

Lancisi and Senac, after Hildanus, consider gangrene of the limbs as a consequence of disease of the heart and large vessels. The late M. Giraud was of the same opinion, and, since his time, many practi-

tioners have considered the gangrene of old persons as usually caused by ossification of the arteries. M. Corvisart justly doubts whether, in such cases, there is any thing else but mere coincidence of independent diseases; and I think that the single circumstance of the rarity of the spontaneous gangrene of the limbs, compared with the frequency of disease of the heart and ossification of the arteries, is sufficient to render the thing quite improbable. This is equally the case with the notion of Testa, that ophthalmia, and sometimes the loss of the eye, may be ranged among the consequences of diseases of the heart.*

SECTION TWENTIETH.

Of the Causes of Diseases of the Heart.

The causes of diseases of the heart are, like the diseases themselves, various in their nature. Ossifications are the result of some aberration of the process of assimilation which is not easily understood. I have already stated my opinion respecting the origin of the excrescences on the valves. The dilatation and thickening of the ventricles, diseases of much greater frequency, also may arise from numerous causes; but these are in general more easily traced to their effects than the former. All diseases which give rise to severe and long-continued dyspnœa pro-

* Delle Malattie del Cuore. Bologna, 1810.

duced, almost necessarily, hypertrophia or dilatation of the heart, through the constant efforts the organ is called on to perform, in order to propel the blood into the lungs against the resistance opposed to it by the cause of dyspnœa. It is in this manner that phthisis pulmonalis, empyema, chronic peripneumony, and emphysema of the lungs, act in producing disease of the heart; and that those kinds of exercise which require great exertion, and thereby impede respiration, come to be the most common remote causes of these complaints.

On the other hand, it is found that diseases of the heart, on the same principle of mutual influence, give rise to several diseases of the lungs. They are thus among the most frequent causes of œdema of the lungs and hæmoptysis. When, however, diseases of the heart are found to co-exist with chronic pleurisy, phthisis, emphysema, and, in general, with chronic disease of the lungs, it will usually be found, on close examination, that the latter are the primary diseases. It follows from these, and other facts noticed under the head of Emphysema and Pulmonary Catarrh, that a *neglected Cold* is frequently the original cause of the most severe diseases of the heart.

To all these causes must be added the congenital disproportion between the size of the heart and the diameter of the aorta. M. Corvisart has, perhaps, gone too far in asserting that there can be no dilatation of the heart without the previous existence of a disproportion of this kind, or of a contraction, or some similar obstruction to the circulation, at a

greater or less distance from the heart; it is, however, true, that it is very common to find an aorta of small diameter in cases of hypertrophia or dilatation of the heart. Still, this is not always the case, and however rational such a cause may be, we can readily conceive many others. We know that the energetic and reiterated action of all muscles notably increases their size, as in the case of those of the right arm of the fencer, the shoulder of the porter, and the hands of most artizans. On the same principle we must admit that even nervous palpitations, or such as originate from moral causes, may, by frequent recurrence, produce a true enlargement of the heart.

There is yet another congenital cause of disease of the heart, which appears to me to be of greater frequency than the small caliber of the aorta, abovementioned,—I allude to a disproportionate thickness of one or both sides of the heart. I am satisfied that in a great many persons the parietes of one or both sides of the heart are either too thick or too thin from birth. In such cases there can be no doubt that the usual exciting causes will be more apt to produce formal disease of the heart than in individuals in whom this disproportion does not exist.

CHAP. II.

DISEASES OF THE PERICARDIUM.

SECTION FIRST.

Of Pericarditis, or Inflammation of the Pericardium.

Pericarditis is inflammation of the serous membrane which lines the fibrous sac of the pericardium, the heart and large vessels. It may be either acute or chronic. This inflammation, like that of all membranes of the same kind, is marked by redness, more or less deep, a concrete albuminous exhalation and a sero-purulent effusion. The redness is almost always but slight in the acute disease. When it exists, it is for the most part only partially. It is most commonly punctuated, and looks as if the surface of the membrane was covered, here and there, with little specks of blood very close to each other. I have never perceived that this redness was accompanied by any thickening of the part. In some cases, wherein, to judge by the thickness of the false membranes, the inflammation appears to have been very great, no redness whatever can be discovered on the serous membrane, on removal of the membranous exudation. This concrete albuminous exudation commonly invests the whole surface of the pericardium, as well on the heart and large ves-

sels, as on the sac. It rarely presents the appearance of an equable membranous layer, like the false membranes of pleurisy; on the contrary, its surface is most frequently marked by a great number of rough and irregular prominences. Sometimes the knobbed appearance of this exudation is very like what would result from the sudden separation of two pieces of slab joined by a pretty thick layer of butter; at other times, it is more like the internal surface of the second stomach of the calf, an observation made, in one case, by M. Corvisart. In certain cases this aspect of the false membrane has given rise to a singular error, having been mistaken for a variolous eruption in subjects dead of the small pox. The consistence of this exudation is usually greater than that of the false membranes of pleurisy; it is also thicker, and more firmly adherent to the subjacent parts; its colour is, however, the same, being of a pale yellow analogous to that of pus.

The serum effused in inflammation of the pericardium is limpid, of a pale yellow colour, or slightly brownish. It contains few fragments of semi-concrete albumen; at least, it very rarely contains enough of these to give it a milky and turbid character. The quantity of this effusion is usually considerable in the commencement of the disease, often as much as a pound. M. Corvisart found it, in one case, to amount to four pounds. It would seem that the quantity of effused serum diminishes quickly, as soon as the violence of the inflammation begins to subside; as we usually find the proportion of serum and of albuminous exudation nearly equal, while in

pleurisy and peritonitis the serum is commonly from twenty to fifty times greater than that of the extravasated lymph. Very commonly even, in very violent cases, we find no effused serum, and only a thick and highly-concrete albumen filling the whole cavity of the pericardium, and uniting the heart and large vessels to the exterior or loose portion of this membrane. In this case we may suppose that the effused serum has been quickly absorbed, and the two layers of false membrane cemented together; although it is not impossible that, in some cases, the more solid exudation may be the only one. We have seen that the same thing occasionally takes place in certain partial and sub-acute inflammations of the pleura; and several observations have led me to believe that the cartilaginous patches that sometimes are met with on the exterior of the lungs (see page 30 and page 162) are produced in the same manner.

When the disease terminates favourably, the pseudo-membranous exudation, after a certain time, is converted into cellular substance, or rather into laminæ of the same nature as the serous membranes; that is to say, the laminæ are double, the exterior surface being exhalent, and the interior, cellular or adherent, and containing the vessels distributed to the part. Sometimes these laminæ are long, sometimes so short that the pericardium seems intimately adherent to the heart.

Before the conversion of false membranes into cellular tissue was well understood, the adhesion of the pericardium to the heart was regarded by divers

authors as a cause of various and serious complaints. Lancisi and Vieussens considered it as constantly causing palpitation; Meckel as rendering the pulse habitually small; and Senac, as productive of frequent faintings. Even M. Corvisart himself has fallen into some mistakes on this head. He admits three species of adhesions,—all of which I have just described as mere varieties or stages of the same affection. These are, 1st, a demi-concrete albuminous adhesion, which is the only one recognized by him as the consequence of pericarditis; 2nd, the very intimate or close cellular adhesion, deemed an effect of gouty or rheumatic affections; and 3rd, the extended or long cellular adhesion, the cause of which is not assigned by him.* M. Corvisart is further of opinion that no person can live, and preserve a good state of health, who is affected with a complete and close adhesion of the pericardium to the heart, or of the lungs to the pleura.

I have, however, met with many cases where this condition of parts was found after death, in which no disorder of the respiration or circulation existed during life. A case adduced by M. Corvisart in support of his opinion (op. cit. p. 34) appears to me rather conclusive against it, inasmuch as the appearances on dissection showed sufficient lesions in other organs to account for the symptoms referred by him to the adhesions between the heart and pericardium.

Sometimes, though rarely, the inflammation is confined to a part only—sometimes a very small

* [illegible] the Heart, &c. by M. Corvisart.

part—of the pericardium. These partial inflammations are in proportion to the general, in point of frequency, hardly as one to ten. Their anatomical characters are precisely the same, only that the albuminous exudation is in them confined to the inflamed part. The serous effusion is sometimes as abundant as in the general disease; more commonly, however, it is less. The inflammation in this case almost always terminates in being cured, by the transformation of the pseudo-membranous exudation into long serous laminæ: scarcely ever are these partial inflammations followed by the intimate adhesion of the parts.

We frequently find on the surface of the heart opaque white patches, sometimes as large as the palm of the hand, more commonly one half or one third this size, and often very small. They are nearly of the thickness of the nail, and have a degree of consistence equal to that of the membranes composed of condensed cellular substance, as, for instance, the exterior membrane of the lymphatic glands. They adhere so closely to the parts on which they lie, that it is difficult to ascertain, even by dissection, whether they are situated above or beneath the fine membrane covering the heart and great vessels. M. Corvisart is of opinion that they are beneath it. I have, however, ascertained the incorrectness of this opinion, as I have several times been able to remove the patches, leaving the serous membrane of the pericardium still untouched.

Are these patches the effect of partial pericarditis and the consequent conversion of the effused lymph

into a condensed membranous cellular tissue? M. Corvisart considers them as produced without previous inflammation, and seated, as I have already said, beneath the serous surface of the pericardium. Both these notions are, I think, inadmissible, inasmuch as there exists no example of an albuminous exudation on the adherent surface of a serous membrane, and as facts without number prove that pseudo-membranous exudations are always the produce of inflammation.

I have lately met with a case which appears to me to throw some light on the question of the origin of these spots. In a man dead of peripneumony, I found a thin false membrane, very firm and of a yellowish colour, investing the right auricle and a portion of the ventricle of the same side, all the rest of the pericardium being quite free, only containing in its cavity two or three ounces of a transparent and slightly yellow serum. Some parts of the false membrane, particularly on the auricle, were of a whiter colour and firmer than the rest, and exhibited an appearance almost the same as the white patches above described.

Chronic pericarditis is always general, occupying the whole internal surface of the serous membrane. This is commonly much redder than in the acute disease. The redness is formed by the close approximation of minute points, which look as if applied with a pencil. Rarely the chronic disease is accompanied by a pseudo-membranous exudation; and when this exists, it is thin, soft, friable, and entirely resembling a layer of very thick pus. In every case

there exists a more or less copious effusion of a turbid, milky fluid, sometimes having quite a puriform character. I am led to believe that the close adhesion of the pericardium to the heart, is commonly the consequence of the absorption of this fluid, and that the adhesion by the long laminæ is the product of the acute disease. In one case I found a close and general adhesion of the pericardium to the heart and large vessels, by means of a false fibro-cartilaginous membrane, in every respect like those of the pleura.

From one case, cited by M. Corvisart, I am led to believe, that there may occasionally arise, subsequently to chronic inflammation of the pericardium, a tuberculous eruption similar to those frequently formed in the false membranes of the pleura and peritoneum. "The portion of the pericardium," he says, "which invests the heart, was of a greyish colour, thickened, unequal, wrinkled, crisp, and containing granulations of which the summit seemed ulcerated." I am the rather led to consider these *granulations* as tubercles, because in the same subject "both lungs, although crepitous, were *granular* throughout." (Op. cit. obs. vii.)

In many cases of pericarditis, especially in the chronic disease, the muscular substance of the heart has lost its colour and become whitish. This loss of colour is sometimes attended by a notable degree of softening, and, at other times, the consistence is natural. Most writers have regarded this loss of colour as a mark of the inflammation of the heart itself, and most of the examples recorded of Carditis

are merely cases of inflammation of the pericardium accompanied by this loss of colour. A great number of those collected by M. Corvisart are of this kind. For my own part I am disposed to doubt the correctness of the opinion that refers this loss of colour to inflammation. We can never be sure of the existence of inflammation in a muscular organ unless we find a deposition of pus among its fibres.

SECTION SECOND.

Of Hydro-pericardium, or Water in the Pericardium.

It is extremely common to find a greater or less quantity of serum in the pericardium; most frequently this does not exceed a few ounces, and can rarely be considered as idiopathic. Most commonly it can only be regarded as taking place in articulo mortis. When there exists a general dropsical diathesis, we occasionally find some water in the pericardium, but, in general, it contains less than the other serous cavities. In the idiopathic hydro-pericardium, on the contrary, the pericardium is commonly the only membrane which contains serous effusion.

The effused serum is sometimes colourless, but more commonly it is yellowish, brownish or reddish, although still perfectly limpid, and without any admixture of flakes of lymph: rarely it is sanguinolent. It is variable in amount. Most frequently it does

not exceed one or two pounds, but it has been found in much greater quantity than this. M. Corvisart records an instance wherein eight pounds were found. This effusion is attended by no change in the heart or its coverings. Some authors have, indeed, stated the heart to have been macerated (macerè) in such cases; but I am disposed to consider such statements as the result of imperfect observation and incorrect description. Very frequently before opening a pericardium partially filled with serum, I have distinctly observed an accumulation of air in the cavity. I have seen this occupy a space the size of the fist, and when as large as this, a distinct hissing sound is perceived in puncturing the pericardium. In place of this continuous mass of air, we more commonly observe a great quantity of small air-bubbles on the surface of the liquid. I am inclined to think that I have found air in the pericardium in cases where there was no serum, but I am not quite assured of the correctness of my observation. At all events, this case of simple *Pneumo-Pericardium* is extremely rare, while the other variety, just described, is by no means so.

SECTION THIRD.

Of Accidental Productions in the Pericardium.

Various species of accidental productions have been found between the pericardium properly so

called, and the pleura; also, between it and the internal and serous membrane; and, lastly, between the serous membrane and the heart. In the Sepulchretum of Bonetus and other collections of cases, we find examples of what appear to be tubercles, cancerous tumours, or cysts, in the different situations just mentioned. But the imperfect knowledge of membranes before the time of Bichat, and the general confusion of all accidental productions under the names of Schirrus, Carcinoma, Atheroma, &c., renders it impossible to ascertain precisely either the nature or site of such morbid growths. I have already noticed the fatty productions, in the form of a cock's comb, developed occasionally between the pleura and fibrous membrane of the pericardium. Twice or thrice I have found tubercles in the same situation, in subjects which exhibited a great number of these bodies in the lungs and elsewhere. I have also seen a tubercle situated at the point of the origin of the pulmonary artery and beneath the serous membrane of the pericardium.

Once only have I met with an instance of ossification between the layers of the pericardium. As this case was remarkable both for its extent and the effects produced by it, I shall here briefly detail it.

Case 45. A man, aged 65 years, had led an intemperate life, but had, nevertheless, enjoyed good health until his fiftieth year. At this time he appears to have had an attack of pleurisy of short duration, but which was followed by œdema of the lower extremities and subsequently by anasarca of other parts, and by dyspnœa and breathlessness on ascend-

ing an elevation, or using any degree of exercise. When he came into hospital, in the end of spring, the dropsical symptoms continued and the lips were swollen and violet. The pulsations of the heart were unequal, irregular, and very distinct, though perceptible over a very small extent of the chest. The pulse was feeble, small, soft, unequal, intermittent and irregular. There was no cough, but copious expectoration. The thorax sounded well superiorly, but badly on the lower parts.

The patient could lie in any posture; slept well, even without having his head raised, and had no sudden startings from sleep.—He died in the course of a few months, the dropsical swellings and dyspnœa having much encreased. The brain, lungs, and abdominal viscera were found in a sound state. The heart was enlarged, and adhered throughout to the pericardium, by means of very close cellular attachments. On first touching it, it seemed to be quite inclosed in a bony case, situated beneath the fibrous membrane of the pericardium; but on further examination this incrustation was found to be incomplete. Around the base of the ventricles there was a zone or band, partly bony and partly cartilaginous, of from one to two fingers' breadth, of unequal thickness, flattened, yet somewhat rough on its surface. This band projected into the angle between the ventricles and auricles, and extended along the interventricular septum on both sides, to near the apex of the heart. The whole of this production was contained between the fibrous membrane of the pericardium and the serous membrane which lines

it internally. The auricles were enlarged so that each might have contained a large egg. One of the mitral valves contained an ossified point of the size and shape of a French bean.

CHAP III.

OF ANEURISM OF THE AORTA.*

In the following observations I shall adhere to the antient distinction of *true* and *false* Aneurisms,—the former comprehending dilatation without rupture of any of the arterial coats, the latter with rupture of some of these.

True aneurism of the ascending portion and arch of the aorta is very common. The dilatation usually extends from the origin of the artery to the point where it begins to descend. This dilatation rarely proceeds so far as to produce very serious symptoms, the extreme point of dilatation of the artery not being wider than from two to three fingers' breadth. The convexity of the arch and anterior part of the artery appear to yield more than the other parts of the vessel. When the dilatation exists in the descending aorta, it assumes the form of an ovoid tumour, gradually terminating, at each extremity, in the undilated artery. It is not uncommon to find several dilatations of this kind in the

* This chapter is more abridged than the others.—Trans.

same artery. Sometimes we find the whole tract of the aorta dilated to double its natural size.

Dilatation in the arch of the aorta, in the degree above described, is very common; but this is not usually named *aneurism* unless it arrives at a considerably greater extent. These sometimes are very large. M. Corvisart records one double the size of the heart, and I have seen them of the size of the head of a full-grown fœtus. When the *true aneurism* acquires a certain size, the inner coat often is ruptured and a *false* aneurism ensues. The true aneurism is commonly accompanied with a morbid degeneration of the internal tunic of the artery. It exhibits spots of a bright red, slight cracks, and a great number of small ossified points. These latter are usually considered as contained in the substance of the inner coat, but they are, in truth, situated between it and the middle coat.

The false aneurism of the aorta, consequent to the true, is rarer than the simple dilatation of that artery; but it is much more common than that greater degree of simple dilatation which alone usually claims the name of *aneurism.*

The false aneurism is most common in the ascending, and the true in the descending aorta. I have never met with any other species of false aneurism in the ascending aorta, or its arch, but that consequent to the true, or simple dilatation of the part. In the descending aorta, however, false aneurism often takes place without any previous dilatation. The opinion at present current in the Parisian schools, viz. that in aneurism the internal coat

remains entire and protrudes, in the form of a hernia, through the ruptured fibrinous tunic, is more untenable, as a general position, than that of Scarpa, who maintains the rupture of the two internal tunics in every case of the disease. Both these opinions are true in certain cases, but not in all.

Aneurisms of the aorta produce various effects on the adjacent organs, according to their volume and position. Simple dilatation, when in a moderate degree, hardly produces any effect, but the most inconsiderable false aneurisms may give rise to very serious disorder. The first and most common of these effects is compression acting on the heart and lungs. When the aneurism is in contact with the lungs, it most commonly merely compresses them; sometimes, however, the substance of these organs gives way, and the aneurism, when it bursts, pours its blood directly into the air-cells. Frequently the aneurism compresses the trachea, or one of the two bronchial trunks, flattens, and eventually destroys a part of them, and death ensues by a species of hæmoptysis from the rupture of the tumour. The same thing occasionally happens with the œsophagus, but not so frequently. I have only met with three instances of death from this cause. The ordinary effect of these aneurisms on the heart, is to displace it more or less, downwards or to one side. Sometimes the aneurism bursts into the pericardium (see Morgagni and Scarpa); but I have never met with an example of this. A case is on record of an aneurism of this kind bursting into the pulmonary

artery.* The left cavity of the pleura is, by far, the most frequent situation for the rupture of these aneurisms. I have met with one case where the aneurism compressed and destroyed the thoracic duct; and M. Corvisart notices a fatal case of compression of the superior vena cava from the same cause. The most remarkable local effects of aneurisms of the aorta, are those on the vertebral column. They often destroy this to a very great depth. This destruction is entirely the work of interstitial absorption, there never being any mark of caries. On the side next the vertebræ the sac is completely destroyed, and the circulating blood is bounded by the naked bone.

Aneurisms of the ascending aorta destroy, in like manner, the sternum by their pressure, so that they are at length covered merely by the skin. I have met with two or three tumours of this sort so large that they could not be completely covered by both hands. The aneurisms of the arch of the aorta, and of the arteria innominata, sometimes project, in like manner, at the top of the sternum or above it, or under the cartilages of the first false ribs of the right side. It is not always the largest aneurisms that most readily make their way externally. Sometimes those of the size of an egg produce this effect, whilst, occasionally, those of the size of the head of a full-grown fœtus remain quite covered and are even compessed by the sternum.

* Bulletin de la Faculté de Med. 1819.

END OF PART FIRST.

PART SECOND.

DIAGNOSIS.

ON THE

DIAGNOSIS

OF

DISEASES OF THE CHEST.

INTRODUCTION.

HOWEVER dangerous diseases of the chest may be, they are, nevertheless, more frequently curable than any other severe internal affection. For this reason medical men, in all ages, have been desirous of obtaining a correct diagnosis of them. Hitherto, however, their efforts have been attended by little success,—a circumstance which must necessarily result from their having confined their attention to the observation and study of the deranged functions only. From the continued operation of the same cause, we must even now confess, with Baglivi, that the diagnosis of the diseases of this cavity is more obscure than that of those of any other internal organ. Diseases of the brain, not in themselves numerous, are distinguished, for the most part, by constant and striking symptoms; the soft and yielding parietes of the abdomen allow us to examine,

through the medium of touch, the organs of that cavity; and thus to judge, in some measure, of the size, position, and degree of sensibility of these, and, also, of the extraneous bodies that may be formed in them. On the other hand, the diseases of the thoracic viscera are very numerous and diversified, and yet have almost all the same class of symptoms. Of these the most common and prominent are cough, dyspnœa, and, in some, expectoration. These, of course, vary in different diseases; but their variations are by no means of that determinate kind which can enable us to consider them as certain indications of known variations in the diseases. The consequence is, that the most skilful physician who trusts to the pulse and general symptoms, is often deceived in regard to the most common and best known complaints of this cavity. Nay, I will go so far as to assert, and without fear of contradiction from those who have been long accustomed to morbid dissections,—that, before the discovery of Avenbrugger, one half of the acute cases of peripneumony and pleurisy, and almost all the chronic pleurisies, were mistaken by practitioners; and that, in such instances as the superior tact of a physician enabled him to suspect the true nature of the disease, his conviction was rarely sufficiently strong to prompt and justify the application of very powerful remedies. The percussion of the chest, according to the method of Avenbrugger, is one of the most valuable discoveries ever made in medicine. By means of it, several diseases, which had hitherto been cognisable by general and equivocal signs only,

are brought within the immediate sphere of our perceptions, and their diagnosis, consequently, rendered both easy and certain.

We must still admit, however, that the method of percussion is far from being complete, or generally available. It frequently affords no indication in phthisis; and in no case does it enable us to distinguish this disease from chronic peripneumony. Even in peripneumony it fails us in a great measure when the inflammation is confined to the centre of the lung, or when both lungs are equally affected, and only in a slight degree. It does not enable us to distinguish the disease just mentioned from pleurisy, hydrothorax, or any other effusion into the cavity of the chest. It completely fails us, or rather certainly misleads us, in the disease called *Pneumo-Thorax*. It gives no indication of the diseases of the heart until this organ is greatly enlarged; and it is often before this takes place that the disease proves fatal. It affords no assistance in aneurisms of the aorta and large vessels, until the nature of the disease is appreciable by the sight, or by the touch. In many other respects, also, the indications afforded by percussion are rendered equivocal by peculiarities of formation, by the niceties required in its performance, and by the circumstances under which it is performed. It is more particularly in diseases of the heart that we regret the insufficiency of this method, and wish for something more precise. The general symptoms of disease in this organ greatly resemble those produced by many nervous complaints, and by the diseases of other organs. The

results afforded by the application of the hand to the part, with the view of judging from the tactual sensations communicated, have been found of some use, in doubtful cases; but, as a general method, this is by far too vague and uncertain to be of much benefit.

In these cases some physicians have attempted to gain further information by the application of the ear to the precordial region; and, doubtless, such a proceeding will encrease the certainty of the diagnosis. Even this, however, is very insufficient; and there are, besides, many reasons why it cannot be followed, as a general guide, in practice. Nevertheless, I had been in the habit of using this method for a long time, in obscure cases, and where it was practicable; and it was the employment of it which led me to the discovery of one much better.

In 1816, I was consulted by a young woman labouring under general symptoms of diseased heart, and in whose case percussion and the application of the hand were of little avail on account of the great degree of fatness. The other method just mentioned being rendered inadmissible by the age and sex of the patient, I happened to recollect a simple and well-known fact in acoustics, and fancied, at the same time, that it might be turned to some use on the present occasion. The fact I allude to is the augmented impression of sound when conveyed through certain solid bodies,—as when we hear the scratch of a pin at one end of a piece of wood, on applying our ear to the other. Immediately, on this suggestion, I rolled a quire of paper into a sort of

cylinder and applied one end of it to the region of the heart and the other to my ear, and was not a little surprised and pleased, to find that I could thereby perceive the action of the heart in a manner much more clear and distinct than I had ever been able to do by the immediate application of the ear. From this moment I imagined that the circumstance might furnish means for enabling us to ascertain the character, not only of the action of the heart, but of every species of sound produced by the motion of all the thoracic viscera. With this conviction, I forthwith commenced at the Hospital Necker a series of observations, which has been continued to the present time. The result has been, that I have been enabled to discover a set of new signs of diseases of the chest, for the most part certain, simple, and prominent, and calculated, perhaps, to render the diagnosis of the diseases of the lungs, heart and pleura, as decided and circumstantial, as the indications furnished to the surgeon by the introduction of the finger or sound, in the complaints wherein these are used.

In prosecuting my enquiries I made trial of instruments of various composition and construction.—The general result has been that bodies of a moderate density, such as paper, wood, or indian cane, are best suited for the conveyance of the sound, and consequently for my purpose. This result is perhaps contrary to a law of physics;—it has, nevertheless, appeared to me one which is invariable.

I shall now describe the instrument which I use at present, and which has appeared to me preferable

to all others. It consists simply of a cylinder of wood, perforated in its centre longitudinally, by a bore three lines in diameter, and formed so as to come apart in the middle, for the benefit of being more easily carried. One extremity of the cylinder is hollowed out into the form of a funnel to the depth of an inch and half, which cavity can be obliterated at pleasure by a piece of wood so constructed as to fit it exactly, with the exception of the central bore which is continued through it, so as to render the instrument in all cases, a pervious tube. The complete instrument,—that is, with the funnel-shaped plug infixed,—is used in exploring the signs obtained through the medium of the voice and the action of the heart; the other modification, or with the stopper removed, is for examining the sounds communicated by respiration. (See Plate VIII.) This instrument I commonly designate simply the *Cylinder*, sometimes the *Stethoscope*.

In speaking of the different modes of exploration I shall notice the particular positions of the patient, and also of the physician, most favourable to correct observation. At present I shall only observe that, on all occasions, the cylinder should be held in the manner of a pen, and that the hand of the observer should be placed very close to the body of the patient to insure the correct application of the instrument.

The end of the instrument which is applied to the patient,—that, namely, which contains the stopper or plug,—ought to be slightly concave to insure its greater stability in application; and when there is

much emaciation, it is sometimes necessary to insert between the ribs a piece of lint or cotton, or a leaf of paper, on which the instrument is to be placed, as, otherwise, the results might be affected by the imperfect application of the cylinder. The same precaution is necessary in the examination of the circulation in cases where the sternum, at its lower extremity, is drawn backwards, as frequently happens with shoemakers, and some other artisans.

Some of the indications afforded by the stethoscope, or *mediate auscultation,* are very easily acquired, so that it is sufficient to have heard them once to recognise them ever after: such are those which denote ulcers in the lungs, hypertrophia of the heart when existing in a great degree, fistulous communication between the bronchia and cavity of the pleura, &c. There are others, however, which require much study and practice for their effectual acquisition.

The employment of this new method must not make us forget that of Avenbrugger; on the contrary, the latter acquires quite a fresh degree of value through the simultaneous employment of the former, and becomes applicable in many cases, wherein its solitary employment is either useless or hurtful. It is by this combination of the two methods that we obtain certain indications of emphysema of the lungs, pneumo-thorax, and of the existence of liquid extravasations in the cavity of the pleura. The same remark may be extended to some other means, of more partial application, such, for example, as the *Hippocratic succussion,* the *mensuration* of the

thorax, and *immediate* auscultation; all of which methods, often useless in themselves, become of great value when combined with the results procured through the medium of the stethoscope.

In conclusion, I would beg to observe, that it is only in an hospital that we can acquire, completely and certainly, the practice and habit of this new art of observation; inasmuch as it is necessary to have occasionally verified, by means of examination after death, the diagnostics established by means of the cylinder, in order that we may acquire confidence in the instrument and in our own observation, and that we may be convinced, by ocular demonstration, of the correctness of the indications obtained. It will be sufficient, however, to study any one disease in two or three subjects, to enable us to recognise it with certainty; and the diseases of the lungs and heart are so common, that a very brief attendance on an hospital will put it in the power of any one to obtain all the knowledge necessary for his guidance in this important class of affections. There are three classes of application of this instrument, viz. as regards the Voice—the Respiration—and the Circulation; all of which I shall here briefly notice as observable in the healthy subject; referring for the varieties of these, as modified by disease, and for the diagnostic indications afforded by them, to the individual affections to be noticed hereafter.

I. The Voice. When a person in health speaks or sings, his voice excites in the whole parietes of the thorax a sort of vibration, which is easily perceived on applying the hand to the chest. This

phenomenon is no longer observable when, through disease, the lungs have ceased to be permeable to the air, or are removed from the contact of the parietes of the chest by an effused fluid. This sign is of inferior value, since a great many causes occasion varieties in the intensity of the vibration, or completely destroy it. For instance, it is little sensible in fat persons, in those whose integuments are considerably flaccid, and in those who have a sharp and weak voice. Anasarca of the chest completely destroys it, even when the lungs are quite sound. In any case it is only very perceptible at the anterior and superior part of the chest, on the sides, and in the middle of the back. From these and other causes we can derive little practical benefit from attending to this particular circumstance.

On making use of the cylinder with the view of further investigating this phenomenon, I soon found, as indeed might have been expected, that it conveyed the peculiar vibration much less distinctly than the bare hand. I also ascertained that the degree of intensity of the vibration varied in different points of the thorax. The places where it is most distinct are the axilla, the back—between the spine and the edge of the scapula, and on the anterior and superior part of the chest near the angle formed by the union of the clavicle with the sternum. When we apply the cylinder to these points, the voice appears stronger and nearer to us; in the others, on the contrary, particularly in the inferior and posterior parts of the thorax, it seems weaker and more remote.

II. Respiration. On applying the cylinder, with its funnel-shaped cavity open, to the breast of a healthy person, we hear, during inspiration and expiration, a slight but extremely distinct murmur, answering to the entrance of the air into, and its expulsion from, the air cells of the lungs. This murmur may be compared to that produced by a pair of bellows whose valve makes no noise, or, still better, to that emitted by a person in a deep and placid sleep, who makes now and then a profound inspiration. We perceive this sound almost equally distinct in every part of the chest, but more particularly in those points where the lungs, in their dilatation, approach nearest to the thoracic parietes, as, for instance, the anterior-superior, the lateral, and the posterior-inferior regions. The hollow of the axilla, and the space between the clavicle and superior edge of the trapezius muscle, exhibit the phenomenon in its greatest intensity. It is equally perceptible on the larynx, on the exposed or cervical portion of the trachæa, and, in many persons, through the whole tract of this canal to the bottom of the sternum; but on the trachæa, and in some degree at the root of the bronchia, the respiratory murmur has a peculiar character, which evidently indicates the transmission of the air through a larger space than the air cells. In this position, also, it often seems as if the patient, in inspiring, inhales the air through the tube of the stethoscope, and expells it by the same, during expiration.

To judge correctly of the state of respiration by this method, we must not rely on the results of the

first moments of examination. The sort of buzzing sensation often caused by the first application of the instrument, the fear, restraint, and agitation of the patient, which mechanically lessen the force of respiration, the frequently inconvenient posture of the observer, and the great sensation occasionally produced by the action of the heart,—are all causes which may at first prevent us from correctly appreciating, or even from hearing at all, the sound of inspiration and expiration. We must, therefore, allow some seconds to pass before we attempt to form an opinion.

I need hardly observe that there must be no noise whatever in the vicinity of the patient. The intervention of clothing, even when of considerable thickness, does not sensibly diminish the sound of respiration; but we must be careful that there is no friction between this and the instrument, as this circumstance, especially if the clothes are of silk, or of a fine hard stuff, may mislead us by exciting a sensation analogous to that produced by respiration. Fatness, even when excessive, and anasarca of the chest, seem to have no notable effect in diminishing the peculiar sound. The sound is more distinct in proportion as the respiration is more frequent. A very deep inspiration made very slowly will sometimes be scarcely audible, while an imperfect inspiration, such, for instance, as hardly at all elevates the chest,—provided it be made quickly, may produce a very loud sound. On this account, when examining a patient, more especially if we have had but slight practice with the instrument, we should

desire the respiration to be performed rather quickly. This is, however, a very unnecessary precaution in most diseases of the chest, as the frequent presence of dyspnœa necessarily renders the respiration quick. The same is true of fever, and the agitation caused by nervous affections.

Many other causes, and especially the age of the individual, alter the intensity of the sound. In children, respiration is very sonorous, even noisy, and can be heard easily even through very thick clothing. In them the close and forcible application of the instrument, to prevent the friction of the garments, is unnecessary, as any noise that might arise from this cause is lost in the intensity of the other. The respiration of children differs, also, from that of adults in other respects besides its intensity. It is impossible to describe this peculiarity, but it will easily be understood by comparative trials. It appears as if, in children, we could distinctly hear the dilatation of all the air cells to their full extent; whilst, in adults, these seem as if, from their stiffness, they could only bear a partial dilatation. This difference of sound is much less marked in expiration than inspiration. The dilatation of the chest in inspiration is also greater in the child, and both these peculiarities are more remarkable as the child is young: they continue, in a greater or less degree, to the period of puberty or a little beyond it.

The sound produced by respiration varies, also, very much in its intensity in different adults. In some men it is scarcely perceptible unless they make a very deep inspiration, and even then, although

sufficiently distinct, it is not one half so audible as in the majority of persons. These individuals have generally a rather slow respiration, and are little subject to dyspnœa, or breathlessness, from any cause. Others, however, have the respiration very sensible even during a common inspiration, without being, on this account, at all more subject to shortness of breath than the former. Some few individuals, again, preserve through life a state of respiration resembling that of children, and which I shall therefore denominate *puerile*, in whatever age it may be perceptible. Such persons are almost all women, or men of a nervous temperament, and they preserve, in some other respects, the character of childhood. Some of these cannot be said to have any actual disease of the lungs, but they soon get out of breath, even though lean, by exercise, and are very liable to catch cold. Others of this class are affected with a chronic catarrh, attended by dyspnœa, a condition constituting one of those cases to which the name of *Asthma* is usually given. With these exceptions, an adult cannot, by any effort, give to his respiration the sonorous character of childhood; but in some morbid states, the respiration spontaneously acquires it, without being, at the time, performed more forcibly than usual. This is particularly the case when one whole lung, or a considerable portion of both lungs, is rendered impermeable to air through disease, especially acute disease. In the sound portion of the lungs, in these cases, the respiration is perfectly similar to that of children. The same thing is observable throughout the

whole extent of the lungs in some cases of fever, and in certain nervous diseases.

At first we are tempted to believe that the superior intensity of the respiratory murmur in children may be owing to the tenuity of the muscles covering the chest, and to the superior suppleness of the tissue of the lungs. But the first cause must have scarcely any effect in this way, since we find that, even in the fattest children, and in those most thickly clothed, the respiration is much more distinct than in the leanest adult examined uncovered; whilst, of the adults who possess the *puerile* respiration, many are very robust and full of flesh. Neither does the quieter respiration of the adult depend on any induration or loss of pliability in the pulmonary tissue, since it sometimes accidentally returns to the character it had in infancy. I am rather disposed to believe that the difference of result depends on the fact of children requiring a greater proportion of air than adults; whether this necessity arises from the greater activity of their circulation, or from some difference in the chemical composition of the blood.

The respiration which is most audible to the ear, is not that which produces the greatest noise in the interior of the chest. I do not here allude to that species of respiration which is accompanied with a rattling or hissing, or any other unnatural sound, but to that kind of respiration which is simply loud, and which is so frequent in dyspnœa. This noise is merely the aggravation of the natural sound made by many persons in sleep, and is caused by the

mode in which the air impinges upon the parts in the fauces. We can imitate it at will. I am acquainted with an asthmatic patient, whose habitual respiration can be heard at the distance of twenty feet, and whose respiration, as heard in the interior of the chest, is, nevertheless, weaker than in the majority of men. The same remark applies to the noise *(snoring)* emitted by many healthy persons during sleep; and, also, to the imitative sounds of jugglers and ventriloquists,—all of which are produced in the throat and posterior nares, and are quite unconnected with the sound of respiration in the interior of the chest.

When we can distinctly perceive, and with a uniform intensity, the respiratory murmur in every part of the chest, we may be assured that there exists neither effusion into the cavity of the pleura, nor any species of engorgement in the substance of the lungs. On the other hand, when we find the respiration is not to be distinguished in any particular point, we may safely conclude the corresponding portion of the lungs within is become impermeable to the air from some cause or other. This sign is as easy to be perceived as the presence or absence of the sound, in the percussion of Avenbrugger, and affords precisely the same indications. With the exception of some peculiar cases, in which the simultaneous employment of the two different methods gives us signs which are completely pathognomonic,—we may state it as a general fact, that the absence of the sound on percussion coincides

uniformly with the absence of respiration, as ascertained by the stethoscope.

As appertaining to the action of respiration, although not observable in the perfectly healthy condition of this function, I shall here briefly allude to a phenomenon which will be more particularly described hereafter. It is the peculiar sound conveyed by the cylinder, when the air, during respiration, is transmitted through fluid matter of any kind in the lungs or bronchia. From its resemblance, both in its origin and character, to what is usually called *the rattles* in dying persons, and from want of a better word, I have adopted this term to denote it whenever it occurs. Its character and varieties will be described hereafter.

III. The Circulation. In the introductory chapter to the Diagnosis of the diseases of the heart, I shall detail, at considerable length, the results obtained by the cylinder, both in the healthy and disordered condition of that organ. At present I allude to them merely; and chiefly for the sake of uniformity.

The alternate contractions of the auricles and ventricles of the heart give rise to sounds very distinct, and of different kinds, so as to enable us to study the actions of that organ even more exactly than by the dissection of living bodies. The truth of this seemingly paradoxical assertion rests on the fact, of the ear judging much more correctly of the intervals of sound, than the eye of the intervals of motions corresponding to these.

In ordinary circumstances the stethoscope, applied between the cartilages of the fifth and sixth ribs, at the end of the sternum, or, indeed, in any point where the pulsation of the heart is perceptible,—conveys to the ear a distinct sound. This, in the healthy body, is double, and each beat of the arterial pulse corresponds to this double sound, in other words, to two sounds. One of these is clear and rapid, and somewhat resembles the sound produced by the valve of a pair of bellows: this corresponds to the systole of the auricles. The other is more dull and prolonged, coinciding with the beat of the pulse and with the shock or impulse communicated to the parietes by the motion of the heart:—it indicates the contraction of the ventricles. The sounds heard at the end of the sternum are produced by the action of the right side of the heart; those between the cartilages of the ribs by the left cavities. In the state of health the sound produced by the contractions of each side is the same.

PHTHISIS PULMONALIS.

(Part I. Page 1.)

In following up my observations on the comparative resonance of the voice in several subjects, both healthy and diseased, I was struck by the discovery of a phenomenon entirely new to me. In the case

of a woman, affected with a slight bilious fever, and a recent cough having the character of a pulmonary catarrh, on applying the cylinder below the middle of the right clavicle, while she was speaking, her voice seemed to come directly from the chest, and to reach the ear through the central canal of the instrument. This peculiar phenomenon was confined to a space about an inch square, and was not discoverable in any other part of the chest. Being ignorant of the cause of this singularity, I examined, with the view to its elucidation, the greater number of the patients in the hospital, and I found it in about twenty. Almost all these were consumptive cases in an advanced stage of the disease. In some the existence of tubercles was still doubtful, though there was reason to suspect them. Two or three, like the woman above mentioned, had no symptom of this disease, and the degree of robustness of these seemed to put all fears of it out of the question. Notwithstanding this I began immediately to suspect that this phenomenon might be occasioned by tuberculous excavations in the lungs. The observation of the same thing in patients who had no other symptom of phthisis, did not appear to me conclusive against the correctness of my suspicion, because I knew it to be by no means unusual to find in the lungs of persons dead of some acute disease, and who had never shown any sign of consumption, tubercles not only softened but excavated, and forming the very case denominated ulceration of the lungs. The subsequent death, in the hospital, of the greater number of the individuals who had exhibited

this phenomenon, enabled me to ascertain the correctness of my supposition: in every case I found excavations in the lungs, of various sizes, the consequence of the dissolution of tubercles, and all communicating with the bronchia by openings of different diameters.

I found this peculiar phenomenon (which I have denominated *Pectoriloquism*) to be more perceptible according to the proximity of the excavation to the superficies of the lungs; and that it was most striking when these adhered to the pleura in such a manner as to render the thoracic parietes almost a part of the walls of the ulcerous excavation,—a case of very frequent occurrence.

This circumstance naturally led me to think, that *pectoriloquism* is occasioned by the superior vibration produced by the voice, in parts having a comparatively more solid, and wider extent of surface; and I imagined that, if this were so, the same effect ought to result from the application of the cylinder to the larynx or trachea of a person in health. My conjecture proved correct. There is a perfect identity of effect between pectoriloquism and the sound of the voice as heard through the tube resting on the larynx; and this experiment offers an excellent mean for giving us an exact notion of the phenomenon, when we have not the proper subjects for observation. Pectoriloquism becomes more striking when we close the other ear by the hand. We then perceive, in the most evident manner, that the whole articulate voice of the patient passes by the cylinder.

In the early stage of Phthisis, neither *percussion* of the chest, nor *auscultation* in any of its forms, affords any means of detecting the disease in ordinary circumstances. When, as sometimes happens, especially in the superior lobes, the tubercles are congregated in great numbers in one spot, so as to form masses of considerable size,—in this case the respiration is inaudible, and percussion elicits a dull sound. This, however, must be considered as a very rare case.

As long as the expectoration retains either of the characters ascribed to the first stage of the disease (see page 39), it is useless to look for the phenomenon of pectoriloquism, for the tubercles being still unsoftened, it cannot exist. But when the expectoration assumes the characters of the second stage (page 40, 41), if we have recourse to the stethoscope at this period, we shall discover incipient pectoriloquism. This will daily become more evident; and sometimes, even at the end of a few hours, will be complete. This is especially the case where the yellow purulent expectoration has existed in great quantity from the very moment of its first appearance.

In upwards of two hundred instances of consumptive subjects, whose bodies I have examined after having ascertained, during life, the condition of their lungs as indicated by the cylinder, I have not met with a single instance in which ulcerous excavations did not exist in those points of the lung over which the phenomenon of pectoriloquism had shown itself distinctly; and as in most of these cases I had

ascertained the existence of this in several points at once, I have, in fact, several hundred of positive observations on this point, and not a single negative one.

On the other hand, I have not met with one case of pulmonary excavations communicating with the bronchia, in any subject whose chest I had completely examined, and during several days, without finding pectoriloquism. This deception, however, it is evident, may readily occur if we are satisfied with a single examination of a patient, or if we confine our examination to one point of the chest; because, as I have already remarked, the sputa contained in the excavations may obstruct, for a time, the communication with the bronchia, and thus suspend pectoriloquism for several hours. On this account, when we have reason to suspect an attack of consumption, and do not find this phenomenon on our first trial, we ought to suspend our judgment until similar observations, repeated at different times, have confirmed or overturned the first indication. If, after repeated trials, we cannot discover pectoriloquism, we must infer either that the tubercles are still immature, or, if softened, that they do not as yet communicate with the bronchia, or, lastly, that the disease is not phthisis.

Although the superior lobes of the lungs are the most common seat of tuberculous cavities, still we must not content ourselves with examining these only, in cases where we do not at first discover pectoriloquism. It sometimes, though rarely, happens that excavations exist in the centre of the lungs, in

their anterior, middle, or lateral parts, or even in their inferior edge, while the superior lobes are uninjured.

In two or three cases only, in subjects which I had thoroughly, though but for a few times, examined, and in which there was no pectoriloquism, have I found on dissection excavations of greater or less extent. In one case of this sort I discovered a cavity large enough to contain a middling sized apple. But in this, and other similar cases, the cavities were almost completely filled by soft tuberculous matter, and communicated with the bronchia only by one or two openings at their inferior and posterior parts, of so narrow a caliber as almost to preclude the escape of the pus by them. Sometimes, also, in cases wherein pectoriloquism had been distinct, in addition to the excavations which afforded this sign, I have discovered, on dissection, other cavities, generally small, though sometimes large enough to contain an almond, which had no communication whatever with the bronchia. These were generally filled with tuberculous matter softened to the consistence of pus. Cases of this sort, it is obvious, are merely exceptions which confirm a general rule; since we know that pectoriloquism cannot show itself but in cases where there is a communication between the bronchia and a cavity, at least empty in part.

I have detected pectoriloquism in subjects in whom, at the time, no other characteristic symptom of phthisis was present; as was, indeed, the case with the first patient in whom I recognized it. In cases of this sort, whose progress I have been enabled

to trace, I have observed the gradual development of phthisical symptoms until they reached that point when their nature could be misunderstood by no one. From all this, I think we are entitled to conclude, that pectoriloquism is a true pathognomonic sign of phthisis, and that it announces the presence of this disease sometimes in an unequivocal manner, long before any other symptom leads us to suspect its existence. I may add, that it is the only sign that can be regarded as certain.

Cough, dyspnœa, puriform sputa, hectic fever, hæmoptysis, emaciation,—in short, the complete reunion of symptoms of which the frightful picture has been so faithfully delineated by Aretæus,—may exist in cases, which we see, nevertheless, recover, contrary to all expectation.* We have already shown that some of these cases may probably be truly cases of phthisis; but there can be no doubt that others are examples of organic affections simulated by *nervous* or mere *functional* disorder.

On the other hand, we frequently observe in cases of true tubercular phthisis, that almost all the usual symptoms of this disease are wanting. Sometimes there is no cough whatever, or it is suspended for months together; and hectic fever is, in like manner, scarcely perceptible, or altogether absent, for as long a period. Even emaciation, which has given its name to the disease, is sometimes very trifling; and death may be occasioned by the mere effect of the tubercular disorganization before it be perceptible. In many cases, again, a colliquative diarrhœa

* See M. Bayle's cases, 48, 49, 50, 51, 52, 53, 54.

and hectic fever are the only symptoms, and, consequently, render the nature of the disease very equivocal.

In this respect, then, the indications of the stethoscope will supply one of the desiderata of medical science, and will help us to distinguish the cases which are quite beyond the resources of nature and art, from those which still leave us room to hope. We have already examined (Part I. page 16) the question how far the presence of pectoriloquism ought to be considered as denoting the existence of an inevitable cause of death.*

It is in the superior lobes that tubercles generally begin to show themselves, and consequently, it is in the parts of the chest answering to these that pectoriloquism is most frequently found,—namely, the anterior and superior part, the axilla, the space between the clavicle and trapezius muscle, and on the upper flat parts of the scapula,—this bone and its muscles having no other effect over the phenomenon than to render the sound duller.

Pectoriloquism is certain or uncertain. It is certain when it possesses the characters described in page 298, and wheresoever we find it with these, even although momentarily, we may be assured that there exists, in the corresponding parts of the lung, an unnatural excavation communicating with the bronchia.

* We shall see, in another place, that there is an analogous phenomenon [Hægophonism] which may sometimes be confounded with pectoriloquism, but which by no means affords the same indications; and there is one case of actual and perfect pectoriloquism, where the cause of the phenomenon is of a much less serious kind than consumption [Dilatation of the Bronchia.]

Pectoriloquism is uncertain when the patient's voice appears somewhat more acute and slightly altered like that of ventriloquists, or when it resounds under the cylinder with more than its natural strength, without seeming to traverse the tube. We have a perfect notion of the uncertain pectoriloquism on applying the cylinder between the inner edge of the scapula and the spine, opposite the origin of the bronchia, in a healthy person that is lean and has an acute voice. This phenomenon naturally exists in this point in such subjects, and, indeed, more or less in all persons, for reasons already stated. In thin narrow-chested children, these points even give sometimes perfect pectoriloquism.

For this reason, we must, in many cases, draw no conclusion from uncertain pectoriloquism, when it exists only in the point just mentioned, in the axilla, or near the junction of the clavicle and sternum. We must even extend the same remark to the whole superior and anterior portion of the chest, when the pectoriloquism is very imperfect and exists equally in both sides. When, however, we find uncertain pectoriloquism in places below the third or fourth rib, or on one side only, there is strong presumption of the existence of an excavation; and if the same phenomenon does not exist in the points above mentioned, the presumption amounts to a certainty; and we must conclude, either that the tuberculous cavity is seated very profoundly in the lungs, or that it is still filled, in a great measure, by imperfectly softened matter. If in any point of the chest, the sound of the voice is much stronger than in the

opposite side, more especially if it is so intense as to seem stronger and nearer than the natural voice heard by the ear, the indication is as certain as if the voice traversed the tube, and we reckon, in such case, the pectoriloquism imperfect, not uncertain. Pectoriloquism is more distinct in proportion as the voice of the person is sharp. This is most frequently the case with women and children. It is, therefore, in them we must be most on our guard against that variety of the phenomenon which I have named uncertain. In persons, on the other hand, with a very deep voice, pectoriloquism is often uncertain when there exist excavations in the state most favorable for its production. In such cases, the voice, much agitated, and as it were trembling, does not enter the tube, but resounds at its extremity with a force double or triple that natural to it. The patient seems to speak through a speaking trumpet, quite close to the observer, and not, as in the case of perfect pectoriloquism, through a tube into his ear. This variety of the phenomenon, especially if it exists on one side of the chest only, affords an indication no less certain than perfect pectoriloquism. This is more particularly the case, if we stop the other ear, and find a very great difference of sound between the place in question, and the other parts of the chest.

When the pulmonary excavations are extremely large we find distinct pectoriloquism changed into this variety, even in persons not possessing a deep toned voice. This fact enables us, in some cases, to trace the progress of the increase and development

of tubercles. In cases of the most perfect pectoriloquism, sometimes the voice, in place of passing uninterruptedly through the cylinder, is intermittent. This circumstance does not, in any respect, affect the indication. Sometimes perfect pectoriloquism ceases for a time, evidently (as we learn from the accompanying *rattle)* by the obstruction of the excavations, or their openings, by the accumulation of the sputa. On this account we must never pronounce a patient to be non-pectoriloquous from a single trial.

Commonly, in cases of pectoriloquism, the voice, as heard through the tube, is somewhat smothered like that of ventriloquists. Like theirs, also, the articulation of some words is very distinct, and of others very obscure and dull. Sometimes it is weaker than the natural voice, but commonly it is louder. Sometimes it seems as conveyed by a trumpet; and at others, as if spoken directly in the ear, without any intermedium, and so loud as to be very disagreeable. Sometimes it resounds as if conveyed by a brass tube, and is accompanied by a very characteristic sort of bleating (chevrottement), which will be described hereafter under the name of *Hægophonism.** This must not be confounded with pectoriloquism properly so called. Sometimes every word is followed by a sort of tinkling, like that of a small bell or glass, which dies away in the tube at a variable altitude. I shall more particularly notice hereafter this sound also, which I have named *metallick tinkling* (tintement metallique). In some cases each

* See Diagnosis of Pleurisy.

word is accompanied by a sound resembling the forcible expiration of the breath in blowing out a candle; and we can hardly believe that some one is not blowing strongly into our ear through the tube of the cylinder.

The most complete extinction of the voice does not affect pectoriloquism; it being often very distinct in persons whose voice cannot be heard at the distance of three or four feet. A moderate-sized and regular-shaped excavation appears to give rise to the phenonemon more decidedly than a very large or irregular one.

We may form some idea of the nature of the contents of an excavation from the particular characters of the pectoriloquism. When the cavities are quite empty, the voice is heard clear and without any extraneous sound. When, on the contrary, they contain a certain portion of soft matter, the voice is accompanied by a sort of guggling noise which renders the articulation less distinct.

In the last stage of Phthisis, that is to say, after the formation of tuberculous excavations, the auscultation of the respiration also affords some useful indications. In these cases the sound of respiration continues very audible over the site of the excavations; but instead of being attended by the usual crepitous noise, it here resembles simply the sound of wind, as of a pair of bellows, or like that observed on applying the cylinder to the trachea, but still more distinct. In these circumstances percussion on the parts often elicits a dull sound, owing to the engorgement surrounding the excavation; and these

two circumstances,—namely, the existence of a spot yielding very forcibly the sound of respiration without crepitus, in the centre of a portion of the chest which sounds badly,—may be considered as pathognomonic of this state of parts. In certain cases, the sound of respiration over the site of tuberculous cavities is accompanied by the sensation as if the patient in inspiration inhaled the air from the tube of the stethoscope and exhaled it during expiration. This is observable on applying the instrument to the trachea and larynx of a person in health.

One species of that variety of respiration, also, which I have denominated *the rattle*, affords some signs almost as characteristic of the disease as pectoriloquism itself. The species here meant is that which I have named the *mucous* or *guggling rattle*. It is produced in the present case by the transmission of air through softened tuberculous matter; in many other cases it arises from the accumulation of sputa or blood in the bronchia or trachea: it is the *dead rattles* of the vulgar. This is the only species of the rattle that can be heard by the unassisted ear, and it can be so only when its seat is in the trachea or larger bronchial tubes. The cylinder enables us to hear it when it exists in any part of the lungs.

The mucous rattle points out the existence of tuberculous excavations when it is found exactly circumscribed, and confined to particular parts of the chest. It sometimes precedes evident pectoriloquism by several days, or even weeks. Both simple respiration and cough produce this species of rattle in tuberculous excavations half-filled with softened

tuberculous matter. When this is very liquid we often can distinctly recognise the fluctuation of a liquid, in place of the rattle. The noise in such cases is sometimes exceedingly like that produced by the escape of water from a bottle held with its mouth directly downwards. Sometimes, but very rarely, the patient himself is sensible of the motion occasioned by the passage of the air in the excavation, which he commonly expresses by saying that he feels the matter expectorated come from that particular point.

In exploring the phenomena of pectoriloquism, if the patient is in bed we ought to make him lie on his back, and at both sides of the bed successively, while we examine the anterior parts of the chest. In examining the lateral parts of the chest, and the axilla, we must make the patient to lean from us; and while examining the upper part of the shoulder he must lean towards us. In examining the back, we seat him in his bed with his back towards us, his body a little bent forwards and his arms crossed. If the patient is seated in a chair, it is best to kneel on one knee while examining the anterior parts of the chest. In every case it is adviseable to make him turn his face away from us while examining him.

PERIPNEUMONY.

(Part I. Page 44.)

Peripneumony is one of the longest known diseases: its diagnostic symptoms are not, however, on this account, unequivocal. Impeded respiration, deep pain in the side affected, incapacity of lying on the opposite one, fever, cough, viscid sputa, sometimes mixed with blood, the urine of a deep red,—are the principal symptoms assigned to this disease by authors. There is, however, not one of these but may be absent in the most violent cases, while, on the other hand, they are almost all common to many other diseases.

In a great many cases of peripneumony there is no pain. Dyspnœa is, in like manner, sometimes very slight, and is frequently unperceived by the patient when it is visible to the medical attendants. Some patients cannot lie on the affected side, though the contrary is much more commonly the case. The cough is sometimes slight and infrequent; and in the chronic variety of the disease especially, (whether this is the original affection or succeeds the acute stage,) it is sometimes so very inconsiderable as scarcely to deserve the name, and its existence is denied by the patient. Even fever, the invariable attendant of inflammatory affections, at least at their

origin, is sometimes totally wanting in this disease after the few first days.

The only one of the general symptoms that can certainly be depended on is the tenacious sputa noticed in the First Part (page 50). But even this is not always well-marked; and, indeed, seldom is so after the first days of the disease.

From all this it follows, that the physicians, who confine themselves, in diseases of the chest, to the examination of general symptoms, must often mistake chronic peripneumony, and even sometimes the acute disease; particularly if they do not see the patient till after the first days of the complaint, or in those cases where the peripneumonic affection supervenes in the course of another disease.

The percussion of the chest, according to the method of Avenbrugger, is a much surer means of ascertaining this disease, in all its stages, than the examination of the external symptoms only. The little time and trouble required by it, and the certainty of its results, would exclude the necessity of any other mode of exploration, if it were applicable in all cases; but we have already seen (page 283) that this is not the case.

The exploration by the cylinder has not this disadvantage: it indicates the pulmonary inflammation in every possible case, and points out, moreover, the degree of it, with much greater precision than percussion. In the first degree of peripneumony, the respiratory murmur is still heard in the part affected, whether percussion affords any sensible alteration of sound or not; and it is, further, accom-

panied by that species of *rattle* to which I give the name of *crepitous rattle,* and which is the pathognomonic sign of this first degree of Peripneumony. This species of rattle resembles the crepitation of solid salts in a heated vessel, or it may be said to be very analogous to the noise emitted by the healthy lungs when compressed in the hand,—only stronger. The only other diseases in which this species of rattle is found, are œdema of the lungs and hæmoptysis. The second and third varieties of peripneumony are distinguished by the total absence of the respiratory murmur. On the patient making a deep inspiration we see and feel the motion of the thoracic parietes, but we hear no sound whatever. Sometimes, however, in place of the natural sound of respiration we hear the *mucous rattle.* This is particularly the case when a pulmonary catarrh is conjoined with the peripneumony, or when the viscid mucous sputa of the early stage are changed, towards its latter stage, into a thicker and more opaque expectoration.* We commonly observe, also, in all the varieties of the disease, but especially in the two first, that the respiration acquires the character which we have named *puerile* (page 292) in the parts of the lung which have remained sound.

When peripneumony terminates favourably, the cylinder becomes a sure measure of the progress of the cure. Before percussion can inform us of any diminution of the pulmonary engorgement, the cylinder enables us to distinguish a slight murmur during expiration. This is first observable in one

* For an account of this species of Rattle see Page 309.

point, and always in the superior portion of the side affected, gaining ground daily, both in degree and extent, until the period of complete resolution. If in this state the patient makes a deep inspiration, we often can perceive, towards its termination, a sort of crepitation like that produced by blowing air into the cellular substance of meat, as practised in the shambles, or like the sudden distension of a dry bladder. The percussion of the chest gives a much tardier indication of the resolution of the inflammation; and, moreover, does not point out the progressive amendment, like the cylinder. This is a matter of great importance both in a moral and therapeutic point of view, and cannot be properly met by attention to the general symptoms merely. It often happens that persons affected with peripneumony, after the use of antiphlogistics, appear almost cured for a few days: the fever and pain go off, the cough becomes less frequent, and the expectoration trifling; the strength and appetite return; but we learn by the cylinder and percussion that the pulmonary engorgement remains quite undiminished. Accordingly, in such cases, we find that after a deceitful convalescence of a few days, or even weeks, the strength again fails, and a fresh inflammation, or merely general exhaustion, with cerebral conjestion and dyspnœa, carries off the patient. In a still more numerous class of cases, peripneumony retains the character of an acute disease only during four or five days, while the organic lesion of the lung is not completely removed till after several weeks.

There are many other cases wherein the method of auscultation is applicable, when that of percussion fails. The following are a few of the circumstances which render percussion either partially or generally useless as a diagnostic: 1st, it is inapplicable to that portion of the thorax occupied by the liver, and also, in a great degree, to the opposite portion containing the distended stomach; 2nd, it is useless in many cases of great fatness; 3rd, in most rickety subjects; 4th, in some few cases it is rendered useless by some unknown peculiarity of constitution; 5th, by the artificial application of a blister to the part; and 6th, when both lungs are inflamed in corresponding points, or when they are violently affected, and throughout a great extent. In this last case death almost always supervenes before the pulmonary engorgement be so far advanced as to be indicated by any peculiarity of sound on percussion.

In this case the cylinder is of great use. Besides the species of slight crepitus that accompanies respiration in the first degree of peripneumony, and the comparative intensity of the natural respiratory murmur in the sound portions of the lungs, this instrument furnishes another symptom quite characteristic in the present case. It is this—although the respiration is still heard in the inflamed parts, we perceive that it is in force very much less than it ought to be, considering its frequency, and the great degree of enlargement of the thorax in inspiration which then conspicuously exists. In these cases the cylinder is of the greatest advantage, inasmuch as the *double peripneumony* (that is, of both

lungs) is one of the most insidious diseases, and may be easily confounded with an attack of asthma or nervous dyspnœa, especially when it supervenes, as it frequently does, during a fever or disease of the heart. In such a case, an opportune bleeding (which is rarely indicated by the *general* symptoms) will often save the patient.

To conclude,—in every case, even where percussion is employed with most advantage, auscultation affords indications more convincing still. Nevertheless, the method by percussion ought never to be omitted in peripneumony. In this case I may observe that the method of auscultation is more simple, requiring only two precautions—namely, to cause the patient to breathe a little more frequently, and to keep the cylinder exactly applied on the chest.

GANGRENE OF THE LUNGS.

(Part I, Page 51.)

The general symptoms of this affection have been already noticed in part first (page 55). When the disease has produced excavations in the substance of the lung, these give rise to pectoriloquism equally with those of phthisis. When these cavities communicate at the same time with the bronchia and cavity of the pleura, and have thereby excited an attack of pleurisy accompanied by pneumo-thorax,

(see page 176), the modification of the respiratory sound, denominated the *metallick tinkling*, is further observable.

HÆMOPTYSIS.

(Part I. Page 60.)

The principal symptoms of this disease are the following:—great oppression, cough attended by much irritation of the larynx, and sometimes by very acute pain in the chest;—expectoration of bright and frothy blood, quite pure or merely intermixed with saliva, or some bronchial or guttural mucus;—pulse frequent, full, and with a particular kind of vibration, even when soft and weak, as it frequently is after a day or two. Of all these symptoms the spitting of blood is the most constant and most severe. This is commonly very copious, returning by fits, with cough, oppression, anxiety, intense redness or extreme paleness of face, and coldness of the extremities. When the hæmorrhage is very great it comes on sometimes with a very moderate degree of cough, and is accompanied by a convulsive elevation of the diaphragm like that which takes place in vomiting. This accounts for the expression—*vomiting of blood*, which is used by most persons who have suffered a violent hæmoptysis.

The hæmoptysical engorgement is usually of too small extent to be recognisable by percussion; and,

besides, it frequently has its seat in those portions of the lung which are beyond the reach of this means of diagnosis.

The stethoscope affords two signs indicative of this affection, viz: 1st, the absence of respiration in a portion of the lung of small extent, and 2nd, a mucous rattle. In that variety of the disease where the blood is furnished by the bronchial membrane, there is the latter indication without the former. Should this distinction be not very clear (as will be the case when the engorgement is of small extent,) it will always be wise to act as if the affection were certainly the more severe of the two.

PULMONARY CATARRH.

(Part I. Page 68.)

In the first part I have stated that the general symptoms of pulmonary catarrh, especially cough and expectoration, afford no certain means of discriminating it from other diseases of the lungs. Mediate auscultation, however, either by itself, or conjointly with percussion, furnishes us with several certain indications, as well of its existence, as its severity. The chief of these is furnished by that modification of the respiratory sound which I have named *the rattle;* and I shall take this opportunity of describing this phenomenon more particularly

than I have hitherto done. The peculiar sounds classed under this denomination are very various; and although they are, in general, very striking in their characters, it is, nevertheless very difficult to communicate a correct notion of them to such as have never heard them. However, from what I have already said respecting them, and what I shall now say, I hope any one will be able to distinguish the different kinds on trial, as they can be much more easily recognised than described.

There are four principal kinds of this phenomenon: 1st, the humid or crepitous; 2nd, the mucous or guggling; 3rd, the dry sonorous; and 4th, the dry sibilous or hissing rattle. The two first of these have been already described (pages 309 and 313).

The *dry sonorous* rattle is more variable in its character than the two former. In this the sound, more or less deep, is sometimes extremely loud, resembling, at different times, the snoring of a person asleep, the bass note of a musical instrument, or the cooing of the wood-pigeon. This last sound is sometimes so exactly imitated that one is tempted to think one of these birds is concealed about the patient's bed. This variety is usually very partial in its extent. I have often found its site in pulmonary fistulæ, at other times in the bronchial tubes preternaturally dilated. We must not confound this species of rattle with common snoring, which, as we have already shown, has its seat in the fauces, and is quite inaudible in the chest.

It is not easy to determine the cause of this phenomenon. The character of the sound does not in-

dicate the presence of any liquid, and the examination, after death, of persons exhibiting it, confirms the indication. I am led by my dissections to believe that it is produced by the partial obstruction or narrowing of a part of the tract of a bronchial tube; whether this takes place from the pressure of a tumour, or of a portion of the lung condensed by inflammation, or by the obstruction produced by a portion of tenacious mucus, or by the partial thickening of the internal coat of a bronchial ramification.

The *dry sibilous* or *hissing rattle* is also varied in its character. Sometimes it is like a prolonged whisper of various intonation; sometimes it is very momentary, and resembles the chirping of birds, the sound emitted by suddenly separating two portions of smooth oiled stone, or by the motion of a small valve. These different kinds often exist together in different parts of the lungs, or successively in the same part.

The peculiar nature of the sound, and the appearances on dissection, prove the sibilous rattle to be owing to minute portions of very viscid mucus obstructing, more or less completely, the small brochial ramifications.

Besides the peculiar sound indicated by the various species of *rattle*, there is also to be noticed a slight sense of vibration communicated to the cylinder when the seat of the phenomenon happens to be in the point immediately beneath it, but not otherwise. When this vibratory sensation can be discovered in no point of the chest, we may conclude

the rattle has its seat in the central parts of the lungs. Some of the species of rattle, especially the mucous and crepitous, cannot be distinguished at the distance of one or two inches from their site. The other kinds may frequently be distinguished through the whole extent of the chest, and, thus, are often combined with the others. The different varieties of this phenomenon frequently convey to the ear a sensation, as if it was accompanied by the successive formation and rupture of bubbles of various sizes, like those made by children from soapy water. Many of the various images suggested by the different sensations are very distinct, and may be described as permanent varieties of the phenomenon. I shall not, however, enter upon this at present.

The indications afforded in disease, by the exploration of the various species of *rattle*, are less numerous, and of much less importance than those furnished by the voice, and by respiration in its simple state.

The above observations respecting the rattle apply to this phenomenon as observed in the chest, and as the cause exists in the ramifications of the bronchia. The same thing is observable over the trachea in certain cases, as in catarrh and hæmoptysis. This is the only species that can be heard with the naked ear; but the cylinder detects it often when inaudible to the ear.

In the commencement of pulmonary catarrh, when there merely exists a slight coryza, almost without cough, and accompanied only by a slight irritation in the throat, the cylinder announces a rattle which

is often very loud. This is usually of a sonorous but dull character, and sometimes hissing. Its site is indicated by the sort of vibratory sensation formerly noticed. When very loud, we can hear it at a distance from its site; but here it is more feeble, and unaccompanied by the vibratory movement.

I am led to believe that the rattle is more grave and sonorous, in proportion as the mucous membrane is much swollen, and the secretion of mucus is small. In proportion as the disease advances and the mucous secretion increases, the rattle gradually assumes the character of *guggling* or *mucous* formerly described.

When the pulmonary catarrh is partial, as is usually the case, the rattle is confined to the part affected. The danger of the disease, and the severity of the general symptoms, are always proportioned to the extent of the local affection. When the rattle is heard over the whole of one lung, or in the greater part of both, the case is always severe. If the disease is acute, it is then attended by a violent fever; if chronic, there are orthopnœa and prostration of strength,—and these symptoms are more severe in proportion as the patient is advanced in life. When the rattle extends over the whole of both lungs (which is only the case when there is violent fever), the disease is almost always fatal, except when the patient is very young.

One of the most remarkable phenomena in the pulmonary catarrh, is, the occasional suspension of respiration in the affected part. This circumstance, which may be considered as pathognomonic of the

disease, often supervenes all at once, and passes off in the same manner, after coughing or expectoration. Its cause is obviously the obstruction of a bronchial tube by the contained mucus. In such cases, sometimes the respiration is not entirely lost, but only so far lessened as to be barely audible.

This suspension of respiration must not mislead the observer to confound this with other diseases. In the present affection, percussion of the chest produces a distinct sound,—a circumstance sufficient to distinguish it from peripneumony, and pleurisy with effusion into the chest. In pneumo-thorax and emphysema of the lungs, the same absence of the sound of respiration and the distinct sound on percussion exist, as in these cases of catarrh. But in the former disease (pneumo-thorax), all the other symptoms are so different, that there can be no risk of confounding the two affections. In the latter disease (emphysema), the very same indications are furnished by auscultation and percussion, as in the pulmonary catarrh; but, in this case, sure means of discrimination are furnished by the general symptoms. Pulmonary catarrh, of sufficient severity to produce suspension of respiration in a large part of the chest, is a severe acute disease, accompanied by fever, strong and frequent cough, and copious expectoration; while emphysema is a chronic affection, whose almost only symptom is the impeded respiration.

Chronic Catarrh. In the former part of this work (page 72) I have adverted to the difficulty of distinguishing this disease from phthisis pulmonalis. In fact the most perfect similitude exists between

the two diseases, in as far as regards the expectoration, the emaciation, and all the other general symptoms.

Percussion gives no assistance in the diagnosis; since, in most cases, the chest sounds quite well in consumptive patients. The indications afforded by the stethoscope are much more to be depended on. In such cases, if, upon properly examining a patient, (viz. at different times, and for a certain length of time,) we find neither pectoriloquism, nor the guggling produced by softened tubercles (see page 309); nor the *tracheal respiration* of tuberculous excavations (see page 308); nor the permanent absence of respiration in certain places (from tuberculous engorgements of some extent, see page 300);—and if the respiration is perceptible over the whole chest, we have a strong presumption that the disease is merely chronic catarrh; and if the same results uniformly present themselves after an attendance of some time (say two or three months), our presumption is converted into certainty.

With regard to the diagnosis of the different varieties of catarrh, I shall only here observe, that in chronic catarrh the rattle is rarely continuous, and still more rarely general over the chest; and that, further, the sound of respiration is scarcely ever suspended as in the acute disease.

In the pituitous catarrh the rattle is usually extremely sibilous and sonorous, frequently resembling the chirping of birds, the sound of a bass string, and sometimes the cooing of the wood-pigeon in a slight degree.

The pathognomonic signs of the *Dry Catarrh* are the same as those of emphysema of the lungs (see Emphysema), a disease which its existence for a short time necessarily produces.

Often in cases of chronic catarrh the respiration acquires the character of *puerile.* In such cases the dyspnœa is greater than usual, and the disease is usually called *Asthma.* In many cases, however, of dyspnœa, which might properly be called nervous (nervous asthma), I have observed the respiration quite natural; in others, I have observed it with the puerile character.

DILATATION OF THE BRONCHIA.

(Part I. Page 76.)

From the time that I had ascertained the dependence of the phenomenon of pectoriloquism on the reverberation of the voice, in an excavation situated amid the pulmonary tissue, and that the same thing was observable on the larynx and trachea, I had no doubt but the lesion in question would give the same result. Owing to the infrequency of this affection of the lungs, I have only as yet verified my conjecture in a single case. A woman, aged 50, died of a disease unconnected with the thoracic viscera. She had been for several years affected with an habitual expectoration, and had before her

death exhibited the phenomenon of pectoriloquism, in a very evident manner, about the third rib on the right side. On examination, we found in the part of lung corresponding to this point, two bronchial tubes dilated to three times their natural size, and and one of them terminating in a cul-de-sac sufficient to contain a small filbert.

We may regard it as certain, that, in the case of partial or general dilatation of the bronchia, pectoriloquism will be found to correspond to the extent of the organic affection. I am also confident that, in such case, the character of the voice, and the sound of respiration, will be such as to indicate that the phenomenon does not arise from an ulcerous cavity; but as I have not yet had an opportunity of verifying this conjecture, I shall not here dwell upon the subject.

EMPHYSEMA OF THE LUNGS.

(Part I. Page 81.)

The general symptoms of this affection are rather equivocal. Dyspnœa being its most striking feature, it is one of the diseases usually confounded under the name of asthma. In it the respiration is habitually impeded, but is aggravated by occasional paroxysms which are quite irregular in their return and duration. Like dyspnœa from any other cause,

it is further increased by the usual causes, such as indigestion, mental emotion, elevated situation, violent exercise, especially that of mounting, &c. It is unaccompanied by any fever, and the pulse is, for the most part, regular. When the affection exists in a high degree, the skin assumes a dirty aspect, with a bluish tint in some places, especially the lips. In all the cases I have seen there was a slight degree of habitual cough, with a very slight mucous expectoration. The complaint often exists from childhood, and does not seem materially to abridge the duration of life. Like other dyspnœas it frequently, in the end, gives rise to hypertrophia or dilatation of the heart.

When this disease occupies only one side, or exists much more in one lung than the other, this side is evidently enlarged, and the intercostal spaces wider. It also yields a more distinct sound on percussion. When both sides are equally affected, the chest yields a very distinct sound throughout, and presents a more rounded outline, both before and behind, than is natural in the sound state of that cavity.

The pathognomonic sign of this disease is furnished by a comparison of the indications derived from percussion and auscultation. The respiratory murmur is inaudible over the greater part of the chest, and is very feeble in the parts where it is audible: at the same time a very distinct sound is produced by percussion. If the disease is not very severe, the sound of the respiration is still audible, but in a much less degree than the sound on

percussion would lead us to expect. There is also heard, in the affected parts, an occasional slight sibilous rattle.

This single circumstance—of the absence of the noise of respiration in a chest, which sounds well on percussion,—is sufficient to distinguish emphysema of the lungs from any other disease of the chest except pulmonary catarrh and pneumo-thorax. We have already made some remarks on the distinction between the former disease and emphysema; and may repeat, that the general symptoms are sufficient to enable any one to discriminate them. The means of distinguishing emphysema from pneumo-thorax will be noticed under the account of the latter disease.

It is difficult to account for the absence of the sound of respiration, in a disease which consists essentially in dilatation of the air-cells, and in which, consequently, there exists more air than is usual in the lungs. The fact is, probably, accounted for by the temporary obstruction of the bronchia by the increased mucous secretion which usually accompanies this disease, and by the partial compression of the air-cells by those dilated. This supposition is corroborated by the fact, that persons affected with this disease have their breath much oppressed, in the first instance, when they chance to catch cold; while the respiration improves immediately after the expectoration commences, and even becomes better than before the catarrhal affection.

ŒDEMA OF THE LUNGS.

(Part I. Page 97.)

The symptoms of this affection are extremely equivocal. Impeded respiration, slight cough, and a watery expectoration are the only signs of it. Percussion affords no useful indication. The stethoscope furnishes two means of diagnosis, but even these are less satisfactory than in most other diseases of the lungs. These are, 1st, the much less degree of distinctness of the respiratory murmur than might be expected from the efforts used in this action, and from the great dilatation of the chest with which it is accompanied; and, 2nd, a slight crepitous rattle like that in the first degree of peripneumony, but fainter. Indeed, the cylinder is not sufficient of itself, without reference to the general symptoms, to distinguish the last mentioned disease from œdema.

There is another case in which it is almost imposible to ascertain the existence of œdema of the lungs, and that is, where it is complicated with emphysema of that organ. The indications of the stethoscope will, in this case, merely point to the emphysema; while, should the patient die, the examination of the body is likely to lead us into an error on the other side, the emphysematous con-

dition of the lung being obscured by the serous infiltration of the air-cells.*

The same difficulty of ascertaining the true character of the lung exists, in a still greater degree, in the case of peripneumony supervening to the emphysema.

With regard to this last complication, I may here remark, though somewhat out of place, that, on the living subject, the cylinder and percussion in the first degree of peripneumonic affection, will only recognise the emphysema, and, in the second or third varieties, will only recognise the peripneumonic affection. This is true of the complication when seen *only after* it is *formed;* if the patient had been seen previously to the supervention of the peripneumony, percussion of the chest would have demonstrated the existence of the emphysema and the invasion of the peripneumony.

ACCIDENTAL PRODUCTIONS.

(Part I. Page 108.)

Whatever be the nature of these bodies, the symptoms attending them are almost always the same, and consist, for the most part, only of a degree of dyspnœa proportioned to the size of the tumour;

* In this case we must pass a ligature round a portion of the lung and dry it, when the true character of the part will be evident.

and cough, varying in degree and in the extent and nature of the accompanying expectoration. The most deleterious productions, even, such as the medullary tumour, sometimes attain a considerable size, and produce death by suffocation, without previously giving rise to marked derangement of functions. Tubercles, more than any of the others, produce general effects on the system. Yet, even in the case of them, these effects rarely supervene until long after their formation, and, indeed, not until after the period of their solution.

When an accidental production has attained a large size, for example that of an egg, the cylinder will indicate its presence by the absence of respiration in the part. But when the tumours are small, and the lung sound in the intervals, the respiration, as indicated by the cylinder, is not at all affected. I have often observed the respiration equally distinct on both sides of the chest, in persons in whom it was found, after death, that one lung was sound, or merely containing a few very small tubercles; and the other filled with tubercles from the size of a millet-seed to that of a filbert, and in such quantity as to give to this lung double or triple the weight of a healthy one. When, in such cases, the intermediate portions of lung are engorged with any species of matter, respiration of course ceases in them; and percussion yields a dull sound.

In the case of cyst noticed in page 112, and in the hydatid described in case 27, page 115, the cylinder must have detected their existence, and in the latter perhaps, might have led to, and justified the per-

formance of, an operation for the relief of the patient. At all events the employment of the cylinder must afford more chance of ascertaining the character of such affections, than any other means we yet possess.

Osseous Concretions. The cylinder gives no assistance in ascertaining the existence of these.

Melanosis. When melanotic tumours soften so as to leave a cavity, they will give rise to pectoriloquism; and when this matter impregnates a portion of the lung, to the extent noticed in page 128, the cylinder will indicate the impermeability of the lung to air, but will not enable us to discriminate the affection from peripneumony.

Medullary Tumour. During the greater part of the existence of this species of tumour in the lungs, there is no sensible degree of fever, and death arrives without any perceptible alteration of the pulse. Emaciation may be very long in taking place, but it always does so, and is rapid in its progress, towards the termination of the disease. The cylinder will point out their presence, as that of other tumours, when they are of a certain size.

PLEURISY.

(Part I. Page 145.)

A well-marked acute pleurisy is, for the most part, easily recognised. The stitch in the side, dyspnœa,

fever, and dry cough, or cough accompanied only by glairy and almost colourless sputa, are often sufficient to afford a moral assurance of its existence, and to do away all necessity of other more precise means of diagnosis. But it is not uncommon to meet with pleurisies, even acute, in which many of these symptoms are wanting; whilst many chronic pleurises, are often so indistinctly characterised, and accompanied by so many functional anomalies, that it is frequently not till after several weeks, or even months, that the true nature of the disease comes to be suspected.

Percussion points out the disease with much more certainty. As soon as the effusion takes place, the resonance of the chest fails over the whole of its site. This failure, indeed, may arise equally from peripneumony: but the nature of the general symptoms, more particularly the character of the expectoration, and the absence or presence of the stitch of the side, will tend to fix the distinction.

Mediate auscultation furnishes us with much more certain means of discriminating these two diseases, and enables us to ascertain with precision, not merely the existence of the effusion, but its quantity. The signs by which the cylinder effects this, are, 1st, the total absence, or great diminution, of the respiratory murmur; and, 2nd, the appearance, disappearance, and return of the sound which I have named *Hægophonism.*

When, as is often the case, the pleuritic effusion is very copious from its very commencement, the sound of respiration is then totally absent through

the whole of the side affected, except in a space of three fingers' breadth along the vertebral column. This complete disappearance of respiration after the existence of disease for a few hours, is quite pathognomonic of pleurisy with copious effusion.

In peripneumony, the disappearance of the respiration is gradual, and is perceived to be unequal in different parts of the chest, being often not lost in the upper part till after some days or weeks; it is, further, preceded for twenty-four or thirty-six hours by a *crepitous rattle* (see page 312) quite characteristic. In pleurisy, on the contrary, the loss of the respiratory murmur is sudden, equable, uniform, and so complete, that no effort of inspiration can render it perceptible. The continuance of the respiration along the spinal column is an equally constant sign. This exists equally in the chronic disease, attended with the most copious effusion. It is explained by the compression of the lungs backwards towards their roots.*

These copious and sudden effusions occur chiefly in old persons, or in adults of weak and cachectic habits. The sudden cessation of the respiration in such cases, must, therefore, be considered as affording a very bad prognostic; as we may be assured that the conversion of the false membranes into cellular substance, and the absorption of the effusion, will take place either not at all, or imperfectly, and the disease will soon pass into the chronic state. In

* In some rare cases the respiration continues to be audible immediately under the clavicle, owing to close adhesions existing in that part, between the lungs and pleura.

children, and persons of strong constitution, the effusion scarcely ever takes place so rapidly and suddenly; and the respiration does not finally disappear till after one or more days. When the effusion is considerable the respiration becomes *puerile* in the sound side.

When the effusion begins to diminish, by absorption, this is first observable by the augmented intensity of the respiratory murmur along the side of the spine, where it had never quite disappeared. Shortly after, it is perceptible in the anterior superior part of the chest, and top of the shoulder, and in a few days it returns in the other parts of the chest. Wherever there are adhesions between the lungs and pleura, of any considerable extent, the respiration continues audible over them in a greater or less degree throughout the whole period of the effusion; and the commencement of the absorption is perceived by the augmented intensity of sound in these places.

The return of the respiratory sound is much more slow in pleurisy than peripneumony. Sometimes it is weeks, and even months, after the reappearance of it near the clavicle, before it is perceptible in the inferior parts of the chest; and, often, for months after the convalescence of a patient, it is only one-half so distinct in the affected side as in the sound one.

To these signs I have to add another, already noticed, and which appears quite characteristic of this disease when accompanied by a middling degree

of effusion:—I mean *Hægophonism,* or *Caprine Pectoriloquism.* This phenomenon has a great analogy to pectoriloquism, and I for a long time confounded it with the latter, considering it as a modification depending on some peculiarity of shape or situation of the tuberculous excavations. It is, however, quite distinct from pectoriloquism, and depends on quite a different cause, as has just been stated. Hægophonism resembles pectoriloquism in consisting, like it, of a strong resonance of the voice under the cylinder. Very rarely, however, in hægophonism does the voice seem to enter the tube, and scarcely ever does it completely traverse it, as in perfect pectoriloquism. The voice seems, further, to be more acute, and as it were *argentine,* than the natural voice of the individual, and exhibits the illusion as if some one were speaking within the cavity of the chest. It has, moreover, another character so constant as to lead me to derive from it the appellation of the phenomenon,—I mean a trembling or bleating sound like the voice of a goat, a character which becomes the more striking as the key of it approaches that of this animal's voice. It also sometimes resembles the sound of the human voice transmitted through a cleft reed, or the nasal intonations of the juggler speaking in the character of Punch. This species of bleating is most commonly combined with the articulation of the words, as heard within the chest; sometimes it seems to be contemporaneous with the articulation, but not arising from the same point; and sometimes it

seems rather to succeed, than accompany the pronunciation of the words.*

I am of opinion that this phenomenon only exists in cases of pleurisy (acute or chronic) attended by a pretty large effusion into the pleura; or in cases of other liquids effused in the same proportion. It has uniformly appeared to me that hægophonism has decreased gradually with the absorption of the effused fluid. In acute pleurisies I have found it sometimes to continue only a few days; while, in the chronic disease, I have known it to continue, with variable intensity, for several months. I have further observed that when the effusion has become very abundant,—especially when so great as to cause evident dilatation of the chest,—this phenomenon has ceased; and I have never met with it in old cases of Empyema, in which the lungs were compressed towards the mediastinum. In cases where it was absent, it has sometimes appeared, on the absorption (as it seemed to me) of a certain portion of the effusion.

Hægophonism further differs from pectoriloquism in being extended over a considerable space. Most commonly it is perceived, at the same time, in the whole space between the scapula and spine, around the inferior angle of the former bone, and in a zone three fingers broad, stretching from the middle of the scapula to the sternum. I consider this phenomenon to be owing to the natural resonance of the

* To hear this sound properly we must apply the cylinder strongly to the patient's chest, and place the ear gently on the other end. If the latter is forcibly applied, the bleating sound is diminished one half, and the phenomenon approaches nearer to common pectoriloquism.

voice in the bronchial tubes rendered more distinct by the compression of the pulmonary tissue, and by its transmission through the medium of a thin layer of fluid. The respiration is always very perceptible in the points where hægophonism exists.

I think there are only two cases of Pleurisy in which this phenomenon will not be observed: These are, (1) where a very rapid and copious effusion has suddenly compressed the lung against the mediastinum; and (2) where a former attack of the same disease has firmly attached the posterior parts of the lung to the pleura.

From the preceding observations I think we are entitled to conclude that hægophonism is a favourable sign in pleurisy, as it seems uniformly to indicate a moderate degree of effusion. Its continuance for some time is a favourable omen, as showing that the effusion does not increase; if it continues as long as the fever, or longer, we may be assured that the disease will not become chronic, as this never happens except when the effusion is extremely abundant.

I am of opinion that simple peripneumony is never accompanied by this sign; but it does not prevent it from being perceptible, when there is pleuritic effusion, even though it has arrived at the degree of hepatization.

Hægophonism, like pectoriloquism, is sometimes suspended for a longer or shorter time, re-appearing after the patient has coughed or expectorated. The cause of this suspension is, doubtless, the same in both, namely, the temporary obstruction

of the bronchia by the sputa. In the site of this phenomenon the respiration is frequently found to be of the kind already described where the patient seems to inspire through the tube of the cylinder.

Contraction of the Chest. Those kinds of pleurisy which terminate by the production of false membranes of a fibro-cartilaginous character, are often extremely obscure, being very variable in their symptoms, and very irregular in their progress. Very frequently there is nothing in their commencement which resembles the acute disease, and it is to them especially that the term *latent Pleurisy* can be applied. The stitch of the side is infrequent and transient, and often so slight as not to be mentioned by the patient unless questioned respecting it. Sometimes the dyspnœa is very slight, and the cough is infrequent and dry; at other times, especially in asthmatic patients, and those subject to catarrhal seizures, there is well-marked dyspnœa, and a plentiful expectoration. In these last, however, the symptoms rather indicate catarrh or asthma, than pleurisy. In some cases the symptoms are quite anomalous, and entirely mislead our attention from the chest. In all such doubtful cases mediate auscultation and percussion offer the only means for detecting the true nature of the disease, by the absence of the usual sound on percussion, and the absence of the respiratory murmur every where except at the root of the lungs.*

In the less severe cases of this nature, and when

* For an account of *Mensuration* of the chest as a diagnostic sign in certain cases of both the acute and chronic pleurisy, see Part First.

the contraction of the chest is not very considerable, after the complete conversion of the false membranes into cartilage, the murmur of respiration returns, in a slight degree in the affected side, but still continues less than in the sound one. This circumstance points out the period of this conversion, and consequently the final cure of this variety of pleurisy. In the patient, from whom Plates VI. and VII. were designed, it was not until two years and half, to reckon from the invasion of the disease, or a year and half, to reckon from the period of his convalescence, that respiration began to be perceptible in the upper parts of the chest. Sometimes the respiration returns completely in the superior parts of the chest, while it is entirely absent in the inferior.

Circumscribed Pleurisy. The absence of respiration in the affected part is the only sign by which the cylinder can indicate the circumscribed pleurisy; consequently it cannot distinguish it from an extensive tumour in the lungs, or from chronic peripneumony. The difficulty, however, will, in general, be removed by attending to the history and general symptoms of the disease.

As the *Hippocratic Succussion* of the chest affords no indication of the simple pleurisy, I shall not notice it in this place. We shall afterwards find it described, and its importance proved, when we come to treat of the diagnosis of those liquid effusions into the chest which are complicated with gaseous fluids.—See Pneumo-thorax.

HYDROTHORAX.

(Part I, Page 192.)

The chief and almost sole symptom of this disease is impeded respiration. Percussion elicits the dull sound, and the cylinder detects the absence of respiration over the whole chest, except at the root of the lungs. I should expect that hægophonism must also be sometimes present. The nature of the general symptoms and the progress of the disease can alone distinguish it from chronic pleurisy.

HÆMA-THORAX.

(Part I. Page 198.)

The cylinder and percussion afford the same indications in this case as in the effusion of pleurisy.

ACCIDENTAL PRODUCTIONS.

(Part I, Page 199.)

Extensive tumours may be distinguished from the effusion of pleurisy and hydro-thorax by the

very gradual and progressive diminution of the sound of respiration in the former; and from peripneumony, by the absence of the crepitous rattle which we have mentioned as pathognomonic of this affection in its first degree.

Intestinal Hernia in the thorax will be readily distinguished, not merely by the absence of respiration in the site of the tumour, but by the existence of borborygmi in a situation superior to the region of the stomach.

PNEUMO-THORAX.

(Part I. Page 203.)

The general symptoms of this affection are very obscure. Percussion, by itself, tends but little to remove the obscurity, or even misleads us. When the gaseous effusion is very considerable, the diseased side yields a more distinct sound than the sound one, and may thus induce us to apprehend disease in the latter. Dilatation of the chest is, also, little to be depended on as a diagnostic sign; its existence together with an increase of sound on percussion, will be apt to lead us to fancy that the lesser volume of the other is owing to a contraction of the latter. In proof of the uncertainty of all these signs I may mention, that out of several cases that occurred, during my attendance at the clinical lectures of M. Corvisart, not one was recognised before death.

The certain diagnosis of this affection is afforded by the comparison of the results of percussion and mediate auscultation. Whenever we find one side of the chest sounding more distinctly than the other, and, at the same time, perceive the respiration very well in the least sonorous side and not at all on the other,—we may be assured that there exists pneumo-thorax on the latter. We may be equally sure of our diagnosis when both sides are alike sonorous, and even although the affected side were less sonorous than the sound one. This latter case occurs when the pneumo-thorax supervenes to pleuritic effusion, or any other fluid extravasation. Here, before the supervention of the pneumo-thorax, the affected side yielded a perfectly dull sound, and the respiration was either entirely absent, or was heard very indistinctly. As soon as the gas begins to accumulate, the resonance of the chest returns, in some degree, in the situation occupied by the air, without, however, being as distinct as in the sound side. Day by day, the extent and intensity of this resonance increase, without any return of the sound of respiration; and if there had previously been any remains of the respiratory murmur, even this now totally vanishes.

There is only one circumstance which can render the diagnosis difficult in such cases: this is, the case of the lung being attached to the side by means of a very short cellular tissue; in the point of adhesion the respiration will be still audible. It is hardly necessary to observe, that, in pneumo-thorax, as in pleurisy and hydrothorax, some degree of respiration

will be still perceptible in that part of the back corresponding to the roots of the lungs.

The only other disease which presents any signs analogous to the above is emphysema of the lungs. The differences, however, between the two diseases are so striking that none but a very inattentive observer could be mistaken: These ifferences are chiefly the following: In pneumo-thorax, the absence of the respiratory sound is complete, except in the point between the scapula and spine corresponding to the roots of the lungs; in emphysema, the respiratory sound is never completely inaudible; in the latter there is a slight *rattle*, and never in the former: pneumo-thorax comes on rapidly and cannot continue long without giving rise to dangerous symptoms, or even proving fatal; emphysema comes on slowly and is never so severe as to confine the patient to bed or incapacitate him for his ordinary occupations. I never saw a patient with pneumo-thorax that was not in bed.

These indications exist in every case of pneumo-thorax; but when it is accompanied by an effusion of fluid, there is observed an absence both of resonance on percussion, and of respiration, in the parts occupied by the fluid; and an absence of the respiration only, in the parts occupied by the gaseous accumulation.

The precise diagnosis of pneumo-thorax, and its existing in a simple state or complicated with liquid effusion, is not a merely speculative subject. It is extremely probable, as Hewson * and Rullier † have

* Med. Obs. & Inq. vol. 3. † Dict. des Sc. Med. *Art. Empyeme.*

imagined that the simple pneumo-thorax is the case which offers most chance of success to the operation of empyema, or rather, of simple puncture of the thorax. This opinion is strengthened by the assertion of Riolan, that he had met with several cases wherein air alone had escaped from the chest on its being punctured.*

The stethoscope furnishes still another and very important sign for the diagnosis of this affection, which has been more than once alluded to already, and which I shall now explain more particularly;—I allude to the phenomenon which I have named *Metallic Tinkling*.

This phenomenon consists of a peculiar sound which bears a striking resemblance to that emitted by a cup of metal, glass, or porcelain, when gently struck with a pin, or into which a grain of sand is dropped. This sound does not at all depend on the nature of the materials of which the stethoscope is composed: it is perceived during respiration, speaking, and coughing; but is much more perceptible during the two latter than the former. The reverse of this is, however, sometimes the case. It is, in general, heard in a most striking manner, during cough; and when in any degree doubtful, this action ought to be performed. It may exist either with or without pectoriloquism.

This phenomenon only exists in that variety of the pneumo-thorax complicated with empyema, and which communicates with the bronchia by means of a fistulous opening, as has been described in Part

* Enchirid. Anat.

First; and it may be considered as the pathognomonic sign of this triple lesion. This peculiar sound seems caused by the agitation of the air confined between the surface of the puriform fluid and the solid parietes. The sound is in general distinct in proportion to the size of the fistula communicating with the bronchia; and, also, in proportion to the volume of gas contained in the cavity of the chest.

When the *tinkling* originates in a large tuberculous excavation in the lung, half-filled by purulent matter, it is less intense, and its vibrations are confined to a small space; it, also, seems to penetrate the tube of the cylinder, and is conjoined with pectoriloquism. All these peculiarities will distinguish this case from pneumo-thorax, setting aside the little resemblance that exists between the general symptoms of the two complaints. I have only observed the metallick tinkling four times in tuberculous excavations.

There exists still another means of ascertaining the existence, during life, of the pneumo-thorax complicated with purulent effusion, which I have also several times alluded to in the first part of this work—I mean the exciting the sound of fluctuation by the succussion of the chest. This method was practised by Hippocrates, or his disciples, and is described by the author of the treatise *De Morbis* in the following words. "After having placed the patient in a solid chair that will not vacillate, cause his hands to be extended by an assistant, and then shake him by the shoulder, in order that you may hear on which side the disease will occasion noise."

Although this method is described in a work not unanimously attributed to Hippocrates, there can be little doubt of its having been known to him. Several passages in the Hippocratic writings either speak of it formally, or allude to it; and it is uniformly represented as a certain test of empyema. The incorrectness of this representation, doubtless, has been the cause of the practise being abandoned by practical men, and never had recourse to even by the commentators of Hippocrates. The authors of treatises of Surgery have, indeed, mentioned it, but doubtfully, and rather out of respect for Hippocrates than for any other reason. I am unacquainted with any author who says he himself had tried the method in question. A few mention the phenomenon as having been observed in certain cases during the spontaneous movement of the chest. Morgagni observed this once, and has collected four other instances of the same fact mentioned by preceding authors (Epist. xvi). A similar case is mentioned by Ambrose Paré.* None of these observers appear to have tried if artificial commotion of the chest, in these cases, would produce the phenomenon; and Morgagni and Fanton even attempt to prove that the practice can be of no benefit as a means of diagnosis.

This opinion is, indeed, correct as far as it regards the simple liquid extravasation, as in Hydrothorax, and Empyema uncomplicated with pneumo-thorax. In this complication, however, the fluctuation of the liquid is distinctly heard on shaking the patient in

* Œuvres, liv. viii. ch. x.

the manner of Hippocrates. Sometimes, also, but much more rarely, the motion of the patient in bed, or in walking, gives rise to it, so as to be heard both by him and the by-standers.

Morgagni has expressed an opinion that this succussion might be dangerous. This, however, is totally unfounded. When properly used, it is not more fatiguing to the patient than the percussion of the chest, or the examination of the abdomen by compressing its contents. To enable us to hear the sound it is not necessary to shake the body much; all that is required being merely to shake the shoulder pretty quickly and to stop all at once. In several of the cases detailed in Part First, this means was successfully used as a test of this peculiar complication of disease. (See Cases 34, 36, 37, 38). In some instances the sound of fluctuation will be perceived by the cylinder when inaudible by the unassisted ear.

OF THE HEART.

OF THE ACTION OF THE HEART IN GENERAL, IN HEALTH AND DISEASE.

Before entering upon the diagnostic signs furnished by the stethoscope in particular diseases of the heart, it will be necessary to examine the general results afforded by it, as well in the sound as diseased state of that organ. I shall do this under four principal heads, viz. 1st, the extent of the heart's action, as ascertained by the cylinder; 2nd, the shock or impulse communicated; 3rd, the nature and intensity of the sound; and, 4th, the rythm of its actions.

I. Of the extent of the Pulsation of the Heart.

This must be considered in two points of view:—first, the sensation conveyed by the instrument when applied to the region of the heart; and, secondly, the parts of the chest (other than this region) in which its action can be perceived.

1. In the natural condition of the organ, the heart, examined between the cartilages of the fifth and sixth ribs, and at the lower end of the sternum,

communicates, by its motions, a sensation as if it corresponded evidently with a small point of the thoracic parietes, not larger than that occupied by the end of the stethoscope. Sometimes, it appears as if it were placed deep in the mediastinal cavity, leaving a vacant space between it and the sternum: in this case its movements, even when pretty energetic, appear to communicate no vibratory impulse to the neighbouring parts. In other cases, again, the heart seems entirely to fill the cavity of the mediastinum, and to extend much beyond the point on which the instrument rests; and, in this case, its contractions, even when slow and noiseless, seem to elevate, to a considerable extent, the thoracic parietes before them, and to displace the adjacent viscera within. This difference of sensation seems, in a word, to convey the impression of the action of a smaller or a larger heart; and, generally speaking, this indication is sufficiently correct, when the organ is examined in the state of quietude which results simply from repose of body.

2. The second point is of more practical importance. In a healthy person, of moderate fullness, and whose heart is well-proportioned, the pulsation of this organ is only perceived in the cardiac region, that is, in the space comprised between the cartilages of the fifth and seventh ribs, and under the lower end of the sternum. The motions of the left cavities of the heart are chiefly perceptible in the former position, those of the right cavities in the latter. This is so much the case, that, in disease of one side of the heart only, the pulsation in these two situations

gives quite different results. When the sternum is short, the pulsations extend to the epigastrium. In very fat subjects, the pulsation of whose hearts is quite imperceptible to the mere touch, the space in which it can be detected by the cylinder is sometimes not more than an inch square. In thin persons, in the narrow-chested, and, also, in children, the pulsation is more extended; being perceptible over the lower third, or even three-fourths, of the sternum, and sometimes even over the whole of this bone; also at the superior part of the left side, as high as the clavicle, and sometimes, though feebly, under the right clavicle.

When the pulsations are confined to the places above mentioned, in subjects of the kind noticed, and when they are much weaker below the clavicles than in the region of the heart, we may conclude that this viscus is well proportioned.

When the pulsations of the heart become more extended, they are heard successively in the following places:—1st, the whole left side of the chest, from the axilla to the stomach; 2nd, the whole of the right side; 3rd, the posterior part of the left side of the chest; and, 4th, the posterior part of the right side. This last is rare. In these cases the intensity of the sound is progressively less in the succession mentioned. This succession has appeared to be constant, and may be taken as an index of the extent of pulsation. For instance, if this be perceptible on the right side, we may be assured that it will be equally so over the whole sternum, under both clavicles, and over the left side; but we are

not sure that it will be so on the back. But if it be perceptible on the back on the right side, we may calculate on its being still more audible in every other part of the chest.

Several circumstances unconnected with the state of the heart may derange the order above mentioned, and augment the extent of the pulsation. This latter effect is produced by a hepatised or compressed lung, and also by a part containing tuberculous excavations. In every case the heart gives two distinct pulsations for one beat of the arterial pulse. In my examinations of several hundred individuals, I have only met with one in whom the pulsation of the subclavian arteries could be heard by the stethoscope; and I may state it as an almost universal fact, that neither the pulsation of this artery, nor of the aorta, can be mistaken for that of the heart.

When the pulsation of the heart is heard over a greater extent than what is above stated to be the range of a well-proportioned organ, the individual rarely enjoys good health. If he has not formal dyspnœa, he has, at least, shorter breath than usual, is put more easily out of breath, and is more subject to palpitation. This state, however, which is that of many asthmatics, may remain stationary many years, and does not always prevent the attainment of an advanced age.

With regard to the relation between the state of the heart and the extent of its pulsation, I think it may be taken as a general fact, that the extent of pulsation is in the direct ratio of the thinness and weakness of the heart, and, consequently, inversely

as its thickness and strength. The size of the organ must also be considered as affecting the extent of its pulsation.

In explanation of what has been just stated, we may presume, when the pulsation extends over all the places above mentioned, that the heart is increased beyond the natural size, and that this increase is owing to the dilatation of one or both ventricles. This presumption will be strengthened, if the pulsation is as great under the clavicles or in the axilla, as in the region of the heart. If the pulsation is perceived neither in the back nor right side, but only in the other points mentioned, and if its intensity is nearly equal in all these, we may conclude that the ventricles are moderately dilated, and that the parietes of the heart are naturally thin. On the contrary, when there is very strong pulsation in the region of the heart, and none or very little under the clavicle; we may be assured (if the patient has other general symptoms of diseased heart) that the disease is hypertrophia of the ventricles. If the patient has never experienced any marked disorder of the circulatory organs, we may be certain that the parietes of the left ventricle are much thickened, though still not sufficient to constitute disease.

Generally speaking, then, it may be taken for granted that a great extent of pulsation is a mark of thin parietes of the heart, more particularly of the ventricles; and that a confined range of pulsation coincides with an increased thickness of these. Some accidental causes may augment for a time the extent of the heart's pulsation, such as nervous agita-

tion, fever, palpitation, hæmoptysis, and, in general, whatever increases the frequency of the pulse.

II. Of the Impulse communicated to the Ear by the Action of the Heart.

In investigating this we must be careful not to confound with the action of the heart, the rise of the thoracic parietes during inspiration. This caution is more particularly necessary when the respiration is very short and frequent.

The degree of impulse communicated by the cylinder to the ear, is, in general, inversely as the extent of the pulsation of the heart, and directly as the thickness of the walls of the ventricles. In a person whose organs of circulation are well-porportioned, this impulse is very little perceptible, often quite imperceptible, especially if the individual is rather fat. When the parietes of the heart are unnaturally thick, the impulse is usually so great as very sensibly to elevate the head of the observer, and sometimes to give a disagreeable shock to the ear. The more intense the hypertrophia, the longer time the impulse is perceptible. When the disease exists in a high degree, we feel as if the heart, in dilating, first comes in contact with the thoracic parietes in one point only, and then with its whole surface, and that it contracts and falls back all at once. The impulse of the heart is only felt during the systole of the ventricles; or if, in some rare cases, an analogous phenomenon accompanies the

contraction of the auricles, this is easily distinguished from the former. In fact, when the systole of the auricles is attended by any sensible action, this is perceived to have its seat much deeper; and most commonly it consists merely of a sort of vibration. In any case, it is very little marked as compared with the sensation produced by the contraction of the ventricles, when these are of a good degree of thickness.

When the parietes of the heart are thinner than usual, no impulse is communicated, even when the pulsation is the greatest; and, in this case, the alternate contraction of its cavities is only distinguished by the sound these produce. A strong impulse, therefore, must be regarded as the chief sign of hypertrophia; and the absence of all impulse as the characteristic of dilatation of the heart. The correctness and constancy of this result have been confirmed to me by many examples.

The impulse of the heart's action is usually perceptible only over the region of the heart, or, at most, over the inferior half of the sternum. When very great, it extends to the epigastrium in cases where the sternum is short. In simple hypertrophia it is usually perceived in no other part; but when this is conjoined with a certain degree of dilatation, it is sometimes distinctly perceived under the clavicles, and in the right side of the chest. The impulse of the heart's action is, of course, diminished by whatever debilitates the general strength of the system.

III. Of the Sound produced by the Action of the Heart.

The alternate contraction of the different parts of the heart produces a peculiar sound, of which the individual is himself sensible during palpitation and in fever. In certain states of disease it can be heard at some distance from the patient; but this is a very rare case. The sound is the only phenomenon usually observable in any other part of the chest beside the precordial; the impulse of its action being confined, as already observed, to that part.

The sound produced by the action of the heart is great in proportion as the parietes of the ventricles are thin and their impulse feeble: consequently, it cannot be attributed to the percussion of this organ against the side. In a moderate degree of hypertrophia, the contraction of the ventricles yields only a dull sound, like the murmur of inspiration, and the auricle, in like manner, a much less noise than in the natural state. In a high degree of hypertrophia, the contraction of the ventricles produces merely a shock without any sound, and the sound of the auricles is scarcely audible. On the other hand, when the ventricular parietes are thin, the noise produced by their contraction is clear and loud, approaching to that of the auricles; and if there be a marked dilatation of the ventricles, the sound becomes very similar, and almost as strong as that of the auricles.

In the state of health the sound of the contractions of the heart is no where heard so strongly as in the region of the heart. In certain states of disease it may be heard more distinctly in other places.

The softening of the substance of the heart deadens the sound of its contractions; as does also any impediment of the circulation, whether caused by too much blood, or by an obstacle in the auriculo-ventricular orifices. This latter state, further, gives rise to a dull rustling sound, very like the noise of bellows, or (when stronger) like that produced by the action of a file on wood. The particular orifice affected is, in this case, indicated by the place and time in which the sound is observed. When the orifice is on the left side, we can sometimes feel with the hand a sort of vibratory sensation like that produced by the purring of a cat. In this case, the noise produced by the contraction of the cavity having the obstructed orifice is not only duller, but much more prolonged than in the natural state.

IV. Of the Rythm of the Pulsations of the Heart.

By *rythm* I understand the order of the constractions of different parts of the heart, and their relative duration and succession, as detected by the cylinder. Before entering on this subject I think it necessary to notice the relative proportions of the heart to the body of the individual, and of the different parts of the heart to each other, in a state of health, and in a well-proportioned subject.

The heart, including the auricles, ought to be of a size equal to the closed hand of the subject, or only a little less or greater than it. The walls of the left ventricle ought to be of a thickness somewhat more than double that of the right. The texture of the left ventricle, firmer and more compact than that of the muscles, ought to keep it from collapsing when laid open. The right ventricle ought to be a little larger than the left, with columnæ carneæ of greater size, and ought to collapse on being cut into. In a heart so proportioned, the alternate contractions of the ventricles and auricles, as examined by the cylinder, and the pulse as examined by the finger, afford the following results:—

At the moment of the arterial pulse, the ear is slightly elevated by an isochronous motion of the heart, which is accompanied by a somewhat dull, though distinct sound. This is the contraction of the ventricles. Immediately after, and without any interval, a noise resembling that of a valve, or a whip, or the lapping of a dog, announces the contraction of the auricles. (I make use of these trivial expressions because they appear to me to express, better than any description, the nature of the sound in question.) This noise is accompanied by no motion perceptible by the ear, and is separated by no interval of repose from the duller sound and motion indicative of the contraction of the ventricles, which it seems, as it were, to interrupt abruptly. The duration of this sound, and consequently the period of contraction of the auricles, is less than that of the ventricles,—an incontestible fact of which Haller

entertained doubts. Immediately after the systole of the auricles there is a very short, yet well-marked interval of repose, subsequently to which we feel the ventricles swell anew, with the dull sound and gradual progression which characterise their action; then follows the quick and sonorous contraction of the auricles, and again the renewed but momentary immobility of the heart. This state of quietude after the contraction of the auricles does not appear to have been known to Haller as a natural condition. The relative duration of the contractions of the auricles and ventricles, appears to me to be as follows: Dividing the whole into four parts, a fourth (or third) belongs to the systole of the auricles, a fourth (or somewhat less) to the state of quiescence, and two-fourths to the systole of the ventricles.—These observations are most conveniently made when the pulse is slow.

From the foregoing observations it appears that the heart, far from being in a state of constant action, as is usually supposed, presents alternations of action and repose, the sum of which does not differ from those of many other muscles, more especially the diaphragm and intercostal muscles. From the proportions above stated it follows that in twenty-four hours the ventricles have twelve, and the auricles eighteen hours of quiescence. In persons whose pulse is habitually below 50, the repose of the ventricles is more than sixteen hours in the four-and-twenty.

Hypertrophia of the ventricles, when in a moderate degree, presents, in some respects, an exaggera-

tion of the natural rythm of the heart's actions. The contraction of the ventricles becomes less noisy, and more readily distinguishable from that of the auricles. After the latter, the interval of quiescence is well-marked, and contrasts very sensibly with the sound that precedes, and the motion which follows it. But in hypertrophia carried to a very high degree the rythm of the heart is singularly changed.

In this case, the contraction of the ventricles is greatly prolonged. This at first is perceived as a profound and obscure motion, which gradually augments, elevates the applied ear, and then terminates in producing the impulse or shock. This contraction is unaccompanied by any noise, or, if this exists, it is merely a sort of murmur like that of respiration.

The contraction of the auricles is extremely short, and almost, or altogether, without sound; and in some cases the systole of the ventricles seems scarcely over before they begin to swell afresh.

In extreme cases there is no sound distinguishable but the murmur above mentioned, and we merely recognise an elevation of the heart corresponding to each beat of the pulse. In these cases the increased brevity of the auricular contraction is not the consequence of their diminished contractibility merely, but, also, of their contraction commencing before that of the ventricles has entirely ceased.

When the walls of the left ventricle are naturally thin, or have become so from dilatation, the rythm of the heart's actions is quite different. In this case, the interval of repose after the contraction of the auricles is no longer perceptible. The contraction

of the ventricles is more sonorous, more resembling that of the auricles, and more approaching the latter in duration. In this condition of the heart, there is, as already observed, a less degree of impulse during the contraction of the ventricles, and a greater extent in the pulsation of the heart. This condition of the organ of circulation is congenital in many cases. It does not necessarily abridge life, but is usually conjoined with a delicate constitution.

Actual dilatation of the heart produces merely an increase of all the characters which indicate a heart with thin parietes. The contraction of the ventricles becomes as short and noisy as that of the auricles; the pulse, consequently, becomes very frequent; and the isochronism of the arterial pulse and the contraction of the ventricles becomes quite indistinguishable. In addition to these signs we must add—the absence of any sensible impulse; the extension of the heart's pulsation over the whole or greater part of the chest; and the existence of this in as great force under the clavicles and the axilla as in the region of the heart itself. This last character, particularly, may be regarded as pathognomonic, if the patient is not phthisical and pectoriloquous in the places mentioned.

V. Of Palpitation of the Heart.

By palpitation of the heart is meant, in the common language of medicine, every beating of the heart which is sensible and unpleasant to the indi-

vidual, and, at the same time, more frequent than natural. When this affection is studied by the aid of the cylinder, we find that there are many varieties of it, all of which appear to have merely this one character in common, viz. that the individual is sensible of the heart's action. Frequently, also, the patient *hears* the pulsation, especially when in the horizontal posture. In the upright position, the contraction of the ventricles only is heard; while, when lying on the side, the individual is sensible of a pulsation of his ear double that of the pulse, viz. the alternate contraction of both the ventricles and auricles. In many cases there is merely an increased frequency of pulsation, although the patient imagines, from his sensations, that there is also great increase of force. This species of palpitation is most common in dilatation of the ventricles, and lasts the longest of any. I have known it continue eight days; the pulse remaining, through the whole of this time, extremely small and weak, and between 160 and 180.

Another variety consists in an increase both of frequency and force of pulsation. This is what arises in healthy persons from great exertion or from moral causes; it also accompanies slight degrees of hypertrophia. In simple hypertrophia in a high degree, the ventricles are found to contract with great force, and to elevate the thoracic parietes in an extent and to a height much greater than natural. The noise, however, produced by their contraction is much duller and more indistinct than usual; the extent of thorax over which the pulsation is percep-

tible is not increased; and, notwithstanding the increase of the heart's power to double or triple its ordinary force, the pulse is, almost always two or three times more feeble and smaller than in the natural condition of the circulation. In hypertrophia with dilatation, the impulse, noise, and extent of the heart's action, are usually equally increased.

VI. Of Irregularity of the Heart's Action.

Irregularity in the pulsation of the heart may exist without palpitation. In old persons this is often met with without any perceptible alteration of the general health. The irregularity which occurs in palpitation consists usually in mere variations in the frequency of the heart's pulsation. Sometimes this variation is almost constantly recurring; at other times it is at longer intervals, and consists only of a few contractions longer or shorter than the rest. These irregularities occur most frequently in cases of dilatation.

In hypertrophia, and during the existence of palpitation, the contractions of the ventricles are so quick, and so much prolonged, that those of the auricles cannot be perceived. It sometimes, though very rarely, happens during palpitation, that each contraction of the ventricles is followed by several successive contractions of the auricles, so quick as only to equal in point of time one ordinary contrac-

tion. Sometimes these contractions are two or four, but most frequently three.

VII. Intermission of the Pulsation of the Heart.

By intermission, we usually understand a sudden and momentary suspension of the pulse, during which the artery is no longer perceptible beneath the finger. The duration of the intermission is very variable, and may serve to divide this affection into well-marked varieties. Sometimes the intermission is shorter than one arterial pulsation; sometimes it is equal; and sometimes it is longer.

The first kind of intermission is the most common; it is frequent in old age, even during health. At other periods of life, it is only observed in certain diseased states of the heart, particularly hypertrophia. By means of the stethoscope we ascertain that this species of intermission always succeeds the contraction of the auricles. It, therefore, only differs from the natural quiescence after this contraction, in the irregularity of its recurrence. The duration and recurrence of this species of suspension of the heart's action are very variable. This, the real intermission, must be distinguished from the false intermission, already noticed, produced by the variation of the duration and strength of the heart's contractions. This can easily be done by the cylinder. The species of intermission which consists in the absence of one complete pulsation, returning sometimes with an exact periodicity at longer or shorter

intervals, constitutes the sign deemed by Solano indicative of the approach of critical diarrhœa. The third variety is accompanied by a state of fullness of the artery during its continuance.

Many considerations, some of which have been stated, prove that the mere examination of the pulse is insufficient to inform us of the true state of the circulation; and must often lead us into error.—To notice only the indications afforded by it as to blood-letting, to prognosis in all diseases, and to diagnosis in several:—

We have seen, that, in peripneumony and pleurisy, the absence of fever and a perfectly natural state of the pulse, frequently accompany an incurable disease. In diseases of the heart, the pulse is often feeble, sometimes even almost imperceptible, although the heart's contraction, that especially of the left ventricle, is much more energetic than natural. In apoplexy, on the contrary, we often meet with a very strong pulse in persons in whom the impulse of the heart's action is scarcely observable. These two opposite facts may easily be verified by the use of the cylinder; I have myself done so, perhaps more than a thousand times, within the last three years. They appear quite inexplicable, unless we admit the arteries to possess a power of action independent of that of the heart.

It would seem to be proved, also, by many other facts, that the different systems subservient to the circulation, although necessarily and reciprocally dependent, have still, in other respects, a particular or individual existence, which, in certain states of dis-

ease and in certain individuals, is more marked and isolated than in ordinary cases and circumstances. This view of the case is supported by the observations of practitioners, in all ages, of the different effects of bleeding, according as it is general or local, venous or arterial, depletive or derivative. The same is shewn by the great benefit of a natural hæmorrhage of a few ounces only, and the inefficacy of copious venesection in the same case; and by the trifling degree of exhaustion produced sometimes by very profuse hæmorrhage, compared with the great collapse occasioned by the bleeding of a few leeches in the same person. These facts prove, I think, that the capillary circulation is in some sort independent of the general. The influence of the latter on the former seems very inconsiderable indeed in certain hæmorrhages from the uterus, bowels, nose or lungs, which are found to be very little affected by the most copious venesection.

The mere state of the pulse, then, is far from indicating the state of the circulation in general; it does not even certainly indicate its condition in the whole heart, as it merely corresponds with the contraction of the left ventricle, which may be regular at the time when that of the auricles and right ventricle is irregular. In like manner, the state of the pulse fails to be a sure guide as to the expediency of blood-letting. Every one knows that in certain cases, for instance in apoplexy, peripneumony, pleurisy, and inflammatory affections of the abdomen, the weakness and smallness of the pulse do not always contra-indicate venesection; on the contrary,

that the artery, in such cases, recovers its force and fullness after the loss of blood. The recognition of this kind of pulse *(fictitié debilis)* is one of the most important and difficult points in the treatment of acute diseases, as an error in respect of it may be fatal. In cases of this sort, the stethoscope affords a rule much surer than the pulse. Whenever the contraction of the ventricles is energetic, we may bleed without fear,—the pulse will rise; but if the contractions of the heart are feeble, although the pulse still retains a certain degree of strength, we must be cautious respecting the employment of venesection. When the pulse is very strong, and the contractions of the heart moderately strong (as is frequently the case in apoplexy), we may still bleed with advantage as long as there is not a marked diminution in the noise and impulse of the heart's actions. But when both the pulse and the heart are feeble, we must not open a vein, whatever be the *name* or the seat of the disease, as such practice must infallibly destroy the few resources still left to nature. The most we can do, in such a case, if there be any local congestion, is, to try, by the application of a few leeches, if the patient can bear the subtraction of blood from the capillaries.

The certainty and facility with which the cylinder indicates the propriety of blood-letting in such cases as those above-mentioned, (which have been hitherto considered among the most difficult in practical medicine,) appears to me to be the greatest advantage to be derived from the employment of this instrument.

After what has been said, and after its general uncertainty avowed by the most experienced practitioners, it may seem surprising that the practice of feeling the pulse has been so generally followed in all ages. The reason of the practice is, however, sufficiently obvious: it is of easy performance, and gives little inconvenience either to the physician or patient; the cleverest, it is true, can derive from it but a few indications and uncertain conjectures; but the most ignorant can, without exposing themselves, reduce from it all sorts of indications. Its very uncertainty gives it a preference with persons of inferior qualifications, over means quite certain in their nature, and which enable the non-professional observer to judge of the skill of the physician by the correctness of his diagnosis and prognosis.

The facts above stated relative to the discordance existing between the pulsation of the heart and of the arteries,—more especially as to strength, are contrary to the more general opinion of modern physiologists, who consider the action of the arteries as entirely dependant on that of the heart. Bichat himself has fallen into this error *.

* Anat. Gener. 1re part. tom. II. page 371.

OF SYMPTOMS COMMON TO ALL THE DISEASES OF THE HEART.

These are—an habitually short and difficult respiration; palpitations and oppression constantly produced by the action of ascending, by quick walking, by emotions of mind,—or without any perceptible cause; frightful dreams, and sleep frequently disturbed by sudden starts; a cachetic paleness and a tendency to anasarca, which, indeed, comes on after the disease has persisted some time. To these symptoms is frequently added the *angina pectoris*,—a nervous affection characterised by a sense of oppression, constriction and oppression in the region of the heart, and a pain or numbness of the arm, more commonly of the left, sometimes of both at once. When the disease has reached a high degree it is recognised at a single glance. The patient, unable to bear the horizontal posture, remains night and day seated in his bed, with the face more or less swollen, sometimes very pale, but more commonly of a deep violet tint, either over the whole or only on the cheeks. The lips are swollen and prominent, of a deeper violet than the rest of the face, or of this hue when it is quite pale. The whole body is more or less anasarcous. The congestion and lentor of the capillary circulation are further shown by affections of the internal organs; for instance—

hæmoptysis, pains of the stomach, vomiting, apoplexy (which frequently terminates such affections), and most of all, dyspnœa, which last symptom has been the cause of confounding such diseases (with many others) under the name of *Asthma*. Emphysema of the lungs likewise bears much resemblance to some varieties of disease of the heart, but the following marks will distinguish them from each other.

In disease of the heart, the patient, although with the respiration habitually short, does not usually experience the feeling of oppression and dyspnœa, except when walking rather quick, or using much exertion, or, more particularly, when ascending an elevation.

On the other hand, the individuals affected with emphysema, become oppressed on the breath when they are quite still: and these attacks recur without any known cause, or from a slight change of the weather. Moderate exercise seems often to relieve them, if the disease has not reached a great degree of intensity.

In diseases of the heart the general circulation is not always so much affected as the capillary. Sometimes the pulse is almost natural, but is often irregular.—At all events, it is evident that none of the general symptoms already mentioned suffice to characterise disease of the heart; and that for a certain diagnosis we must recur to mediate auscultation. It is necessary here to remark that the study of the physiological conditions of the heart, by means of the cylinder, requires much more time and applica-

tion than that of the voice and respiration. In hospital practice, also, owing to our general ignorance of the anterior history of patients, we are liable to be led into error by its use, without proper care. For example, we may, in some cases, consider a patient as labouring under hypertrophia or dilatation of the heart, when he is merely affected with nervous palpitatons. Another, and more insidious cause of mistake, arises in diseases which diminish the extent of respiration; for instance, peripneumony, emphysema, and more particularly chronic pleurisy. In cases of this kind I have sometimes found the heart enormously dilated and thickened after death, although, during life, its contractions had been perfectly natural in respect of sound, impulse and rythm. It would seem as if the diminished capacity of the lungs produced a diminished action of the heart. The fact here alluded to was observable in cases 6, 19, 21, and 23. Cases of this kind are, however, rare, even in an hospital; in private practice, the previous history of the disease will generally prevent us from being misled.

HYPERTROPHIA OF THE LEFT VENTRICLE.

(Part I. Page 213.)

It is to this variety of the disease, especially, that the symptoms attributed by M. Corvisart to *active aneurism* of the heart, must be referred. These are,

—a strong full pulse, strong and obvious pulsation of the heart, absence or diminution of the sound afforded by percussion on the region of the heart, and a tint of complexion rather red than violet. None of these symptoms, however, are constant; and it is not uncommon to find the disease in persons who have none of them. The pulse, in particular, is very deceptive, being almost as frequently weak as strong, in such cases.

The cylinder furnishes signs which are much more constant and positive. The contraction of the left ventricle, examined between the cartilages of the fifth and sixth ribs, gives a very strong impulse, and is accompanied by a duller sound than natural; it is more prolonged in proportion as the thickening is more considerable. The contraction of the auricle is very short, productive of little sound, and, consequently, scarcely perceptible in extreme cases. The pulsation of the heart is confined to a small extent, being, in general, scarcely perceptible under the left clavicle, or at the top of the sternum; sometimes it is confined to the point between the cartilages of the fifth and seventh ribs. In this disease the patient experiences, more constantly than in any other, the sensation of the action of the heart; but he is less subject to violent attacks of palpitation, except from accidental causes, such as moral affections and violent bodily exertion. In this case, during the palpitations, irregularity and intermission of the pulse are uncommon: there is rather increase of the power of the ventricles than of the noise produced by their action.

HYPERTROPHIA OF THE RIGHT VENTRICLE.

(Part I. Page 213.)

According to M. Corvisart, the symptoms are the same as when the disease is on the other side, only that the respiration is more oppressed, and the colour of the face is deeper. Lancisi has mentioned the swelling of the external jugular veins, with a pulsation analogous to that of an artery, as a sign of the aneurism of the right ventricle. M. Corvisart has rejected this symptom, because, he says, "it has been found in cases where the left side of the heart was dilated, and because the pulsation may be confounded with that of the carotids." In this opinion I differ from M. Corvisart. I have uniformly found this symptom in every case of this kind, of any degree of severity; and I have never met with it in hypertrophia of the left ventricle, unless there existed, at the same time, a similar affection of the right. I think a very little attention must distinguish this pulsation from that of the carotids. I would, therefore, be disposed to regard this symptom as one which ought to lead us to suspect the existence of the thickening of the right ventricle.

The contractions of the heart, as explored by the cylinder, give the same results nearly, whether the hypertrophia be on the right or left side; only, in the former case, the shock of the heart's action is

greater at the bottom of the sternum than between the cartilages of the ribs, which is the reverse of what happens when the disease is in the left side of the organ. In most men, in health, the heart is heard equally in both these places; and I am disposed to believe, when heard better below the sternum, we may suspect an incipient hypertrophia or dilatation of the right ventricle. When both ventricles are affected, the symptoms of both coexist, only those of the right side are almost always more marked.

DILATATION OF THE LEFT VENTRICLE.

(Part I. Page 215.)

The symptoms of this affection, according to M. Corvisart, are—"a soft and weak pulse, and feeble palpitations:—the hand applied to the region of the heart feels as if a soft body elevated the ribs, and did not strike these with a sharp and distinct stroke."

The only certain sign of the existence of this disease is that given by the stethoscope, viz. the clear and sonorous contractions of the heart between the cartilages of the fifth and seventh ribs. The degree of distinctness of the sound, and its extent over the chest, are the measure of the dilatation: thus,—when the sound of the contraction of the ventricle is as clear as that of the contraction of the auricle, and if it is, at the same time, perceptible on the right side of the back, the dilatation is extreme.

DILATATION OF THE RIGHT VENTRICLE.

(Part I, Page 215.)

According to M. Corsivart the state of the pulse and the pulsation of the heart, are very nearly the same as in dilatation of the left ventricle, only that the action of the heart is heard somewhat better towards the bottom of the sternum than in the region of the heart. More certain symptoms he considers to be—a greater degree of oppression, more marked serous diathesis, more frequent hæmoptysis, and a more livid state of the countenance,—than in the affection of the left ventricle. With regard to the swollen state of the jugulars without pulsation, which M. Corvisart considers of little importance, I am disposed to look upon it as the most constant and characteristic of the *equivocal* signs of this affection. The only constant and truly pathognomonic symptom, however, is the loud sound of the heart perceived at the bottom of the sternum, and between the cartilages of the fifth and seventh ribs of the right side. The degree of dilatation is measured by the extent of the action of the heart over the chest. The palpitations which accompany this affection consist, principally, in an increase of the frequency and sound of the contractions, while, at the same time, the impulse of the heart's action is frequently feebler than in the ordinary state of the patient.

DILATATION WITH HYPERTROPHIA OF THE VENTRICLES.

(Part I. Page 216.)

In this case there is a combination of the symptoms of the two affections. The contractions of the ventricles yield at the same time a strong impulse and a very marked sound, and they are felt widely over the chest. When palpitation is present, the hand applied to the region of the heart is forcibly raised. Even in the absence of palpitation, if we observe the patient, we find his head, limbs, and even his bed-clothes shaken at each contraction of the heart. The beating of the arteries is often visible.

DILATATION OF ONE OF THE VENTRICLES WITH HYPERTROPHIA OF THE OTHER.

(Part I. Page 216.)

The signs of this complication are—a mixture of those common to each affection, with predominance of those belonging to the one of greater intensity. They are to be discovered by comparing the two sides of the heart together. In this case, however, the indications of the cylinder must be taken in conjunction with those of the general symptoms of disease, else we shall be led into error.

DILATATION OF THE AURICLES.

(Part I. Page 218.)

The symptoms of this affection are obscure: M. Corvisart does not distinguish them from those of the corresponding ventricle. I have not myself had yet sufficient experience of the use of the stethoscope in this affection, to speak confidently on the subject. I think, however, there can be little doubt that the signs afforded by it must be confounded with those arising from the disease of the ventricles, or of the valves, of which the auricular affection is the consequence.

Of partial dilatation of the heart, and of the induration of its substance, I have nothing to say in this place.

SOFTENING OF THE HEART.

(Part I. Page 222.)

Cases of total softening of the heart are usually accompanied by a certain degree of cachexy, even when the individuals are otherwise in tolerable health. When such subjects are attacked with dilatation or hypertrophia of the heart, as almost always happens,

they do not present the usual swollen and livid state of the face observable in other cases of this sort.

When softening exists along with dilatation of the ventricles, the sound produced by the contraction of these cavities, although loud, is yet dull, and without the clearness which attends common dilatation. When it is complicated with hypertrophia, the sound of the contraction of the ventricles is so obtuse as to be nearly inaudible; and in extreme cases, the impulse of the heart is attended by no noise whatever.

CARDITIS.

(Part I. Page 232.)

In the present state of our knowledge it is impossible to ascertain the existence of either an abscess or ulcer of the heart.

CARTILAGINOUS AND BONY INDURATION OF THE VALVES OF THE HEART.

(Part I. Page 236.)

The symptoms of ossification of the mitral valve are somewhat different from those attending the same affection of the sigmoid. According to M. Corvisart the principal sign of the former lesion is "a peculiar rustling sensation, perceived on the ap-

plication of the hand to the region of the heart." I have often noticed this symptom, which is very readily recognised after being once perceived, although it is difficult to give a description of it. The nearest idea I can give of it is by comparing it to the purring of a cat when pleased. The same sort of quality is said, by M. Corvisart, to exist in the pulse, which, he adds, is weak, but without hardness or fullness. To these symptoms may be added those characteristics of hypertrophia and dilatation of the left auricle and whole right side of the heart, which usually follow the affection of the valve.

I must confess that I have never perceived the peculiar character of the pulse described by M. Corvisart; and that I have frequently found wanting the peculiar vibration in the region of the heart in cases of undoubted disease of the valves. I believe the latter sensation is only perceptible by the hand when the contraction of the orifice is very considerable. In ossification of the sigmoid valves, several signs deduced from the state of the circulation are given by M. Corvisart, but the whole may be reduced to the *purring* sensation above mentioned.

Since I have used the cylinder I have only met with three cases of ossification of the mitral valve accompanied by the purring sensation; and only four cases of the same affection of the sigmoid, in a slight degree, and unattended by the purring. In comparing these, however, with the numerous cases I had before studied, I think I can give the following results, if not correct, as, at least, approaching to correctness.

Ossification of the mitral and sigmoid valves does not produce irregularity of the circulation, and cannot therefore be suspected from the state of the pulse, or by the application of the hand to the region of the heart, unless it is so considerable as materially to lessen the orifices of the left ventricle. In ossification of the mitral valve, in a middling degree, the sound which attends the contraction of the auricle becomes much more prolonged, more dull, and with something in its tone which reminds one of the rasping of a file on wood, and sometimes of a bellows smartly compressed. This sound is well-marked when the *purring* is not perceptible to the hand, but it is much more distinct when this is perceptible, and is, indeed, proportional to its intensity.

The ossification of the sigmoid valves of the aorta is shown by the existence of this sound during the contraction of the ventricle; but this does not exist in slight degrees of the affection, nor in a similar condition of the mitral.

In these cases, as in dilatation and hypertrophia, the alternate examination of the heart under the sternum and between the cartilages of the fifth and seventh ribs, as well as the state of the external jugulars, will always enable us to decide in which side of the heart the disease exists.

PERICARDITIS.

(Part I. Page 263.)

1. *Acute Pericarditis.* There are few diseases attended by more variable symptoms, or of more difficult diagnosis, than this. Sometimes it appears with all the symptoms of a very violent disease of the chest; at other times it proves fatal without leading us, in the least, to suspect its existence. Again, we find cases marked by all the symptoms usually attributed by nosologists to this disease, and in the subjects of which, after death, we discover no traces of its existence. The same difficulty is acknowledged, or at least encountered, by most practitioners. Corvisart attributes the difficulty to the circumstance of pericarditis being almost "always complicated with pleurisy, peripneumony, or some other disease of the chest, which masks its peculiar symptoms." These complications, which are very common, must, unquestionably, have this effect where they exist; I must, however, confess, that the most completely latent affections of this kind that I have met with, were in subjects whose thoracic viscera were, in every other respect, quite sound, and who had died of disease of the abdomen. These facts seem to prove that inflammation of the pericardium is sometimes a local affection of little violence, and of very inconsiderable influence on the general system

or even on the circulation; while, in other cases, it is accompanied by an acute fever, and by such violent disorder of almost all the functions, as to compromise the life of the patient.

M. Corvisart is likewise of opinion that it is when the disease is very acute, that the symptoms are very obscure. "Its invasion, he says, is sudden, its progress rapid, its termination almost instantaneous." When it exists in a less violent degree, but still acute, he thinks that it can be recognised by the following symptoms: viz. sense of heat in the region of the heart; great difficulty of respiration; greater colour of the left cheek than the right; pulse at first, frequent, hard and rarely irregular,—becoming about the third or fourth day, small, hard, contracted and often irregular; great anxiety, slight palpitations; partial faintings; *peculiar* change of features; and (towards the close of the disease) total or partial cessation of the local pain.

These symptoms are certainly sometimes present in pericarditis; but each, or all of them may be absent, and some of them are very rare. I have never observed the increased colour of the cheek, have rarely heard complaints of local heat or pain, and, in place of the progressive increase of irregularity in the pulse (as described by M. Corvisart), I have uniformly found this irregularly intermitting, wiry, and almost insensible, from the very commencement of the disease.

I must admit that the stethoscope scarcely furnishes us with any more certain signs of this disease. The following appear to me to be the most common

symptoms of the inflammation of the pericardium, when not latent: the contraction of the ventricles yields a greater shock, and sometimes a more marked sound, than usual, and, at intervals; feebler and shorter pulsations are perceived, which correspond with intermissions of the pulse, the smallness of which contrasts remarkably with the strength of the heart's pulsation. When these symptoms come on suddenly in a person who had never been affected with disease of the heart, there is great probability of their being the consequence of this disease. In addition, it is further common for the patient to have much dyspnœa and very great anxiety; and to suffer syncope on taking a few steps, or on moving suddenly in his bed.

2. *Chronic Pericarditis.* The signs of this variety are still more uncertain than those of the acute disease. I have attended several cases which I considered, throughout their whole course, as chronic inflammations of the pericardium, but which almost all were cured. In two or three cases only have I been able to verify the correctness of my diagnosis by examination after death; whilst very frequently I have found the pericardium full of pus, and in a true state of chronic inflammation, without having been at all led to suspect such an affection. In the cases which have occurred within the last three years, I have found the symptoms to be precisely the same as in the acute disease, only less violent. From one to two years has elapsed before a cure has taken place; and when this has been effected the action of the heart and pulse has become natural and regular.

HYDRO-PERICARDIUM.

(Part I. Page 270.)

Authors vary respecting the symptoms of this affection. Lancisi states the principal to be a sensation of an enormous weight in the region of the heart. Reimann and Saxonia assure us that the patient feels his heart swimming in water. Senac says he has seen the fluctuation of the fluid between the third, fourth and fifth ribs. M. Corvisart says he has perceived this fluctuation by the touch, and adds the following as marks of the affection:—sense of weight in the region of the heart; inferior resonance on percussion; pulsation of the heart irregular and obscure, and felt over a large space and with variable intensity in the same and different points of this space; pulse small, frequent, and irregular; threatened suffocation on lying in the horizontal posture; frequent syncope, but rarely palpitation; œdema. To these symptoms I may apply the same remarks as to those of pericarditis: they may exist, in greater or less number, with or without hydropericardium. I am unable to say, from experience, how far, and in what respect, the cylinder will assist the diagnosis of this disease.

ANEURISM OF THE AORTA.

(Part I. Page 274.)

There are few diseases so insidious as this. It cannot be certainly known till it shows itself externally. It can hardly be suspected, even when it compresses some important organ and greatly deranges its functions. When it produces neither of these effects, the first indication of its existence is often the death of the individual as instantaneously as if by a pistol-bullet. I have known men cut off in this manner, who were believed to be in the most perfect health, and who had not complained of the slightest indisposition. We must, therefore, admit that aneurism of the aorta has no symptoms peculiar to it; all those noticed by authors, and especially by M. Corvisart, being indicative merely of the change or compression of adjoining organs. This will be evident by the enumeration of the principal of these; viz. oppression on the chest,—dissimilarity of the pulse in both arms,—a whizzing or rushing at the top of the sternum, perceptible by the hand,—obscure sound on percussion,—rattling in the throat, and dragging downwards of the larynx, when the tumour compresses the trachea, &c. After what has been said of the symptoms of other diseases of the chest, I need not remark how very equivocal all these are. In the present state of our knowledge

there certainly exists no certain means of ascertaining the existence of this disease until it shows itself externally. And hitherto, my experience has been insufficient to enable me to say how far this difficulty is likely to be removed by the use of the stethoscope. Since my employment of this instrument I have met only with a dozen cases of what I conceived to be aneurisms of the aorta. Most of these left the hospital after obtaining relief by blood-letting and proper diet. In two instances of moderate dilatation of the arch, I was enabled to verify by dissection my previous diagnosis afforded by the cylinder; and in a third, which showed itself externally, I was enabled to verify still further the diagnostic indications. In this last case, I found the pulsations of the tumour perfectly isochronous with the pulse at the wrist; they gave, at the same time, a much greater impulse and louder sound than the mere contraction of the ventricles; and the contraction of the auricles was not at all perceptible. This pulsation, which I shall call *simple*, in opposition to that of the heart, which is *double* (including the alternate contraction of auricles and ventricles), was distinctly perceptible between the right scapula and the spine. In some cases, this *simple* pulsation and greater impulse may indicate the disease, but I must confess that I have myself been deceived in three cases notwithstanding these indications. I would, therefore, say that even this *simple* pulsation will not assist us in distinguishing aneurisms of the arch or ascending aorta from dilatation of the ventricles.

Another sign, however, will still remain, though less marked than the *simple* pulsation above mentioned: it is this: If we find under the sternum, or below the right clavicle, the impulse of the circulatory organ isochronous with the pulse, and perceptibly greater than that of the ventricles examined in the region of the heart, we have reason to suspect dilatation of the ascending aorta, or arch,—the more so, as it is extremely rare to feel the impulse of the organ of circulation beyond the region of the heart, even in cases of the most marked hypertrophia.

The whole of my experience on this subject leads me to the following conclusions: 1st, in several cases aneurisms of the ascending aorta can be ascertained by the cylinder; 2nd, in other cases, it requires the greatest attention to distinguish their pulsation from that of the heart; 3rd, aneurisms of the pectoral aorta can be recognised, more especially when they have produced injury of the vertebral; and 4th, all of them will be often mistaken, because nothing will lead to the examination of the chest, and because there will often be no sign whatever of ill-health.

END OF PART SECOND.

APPENDIX,

CONTAINING SOME CASES NOT TRANSLATED IN THE BODY OF THE WORK, AND FULLER DETAILS OF SOME THAT HAVE BEEN TOO MUCH ABRIDGED.

CASE. (No. xxxvi. of the Author, not translated in the body of the work). PHTHISIS PULMONALIS.—*Tuberculous cavity partly converted into fistula, producing the metallick tinkling.* A woman, 50 years of age, who had been affected with cough and expectoration for several years, and which had got much worse within a few months past, came to the Hospital on the 13th April, having, for the first time, been obliged to desist from her ordinary occupation. She looked much older than she was, and was very thin. The pulse was quick, skin slightly hot, and the expectoration, which was in moderate quantity, consisted of thick yellow sputa intermixed with much transparent ropy mucus.

The stethoscope, applied to the anterior and upper part of the right side, and to the right axilla, detected distinct pectoriloquism; and, in the same places, when the patient coughed or spoke, and still more during respiration, there was heard a tinkling, like that of a small bell which has just stopped ringing, or of a gnat buzzing within a porcelain vase. A mucous rattle, or strong guggling, existed in the same points; and all these phenomena were distinctly

perceptible over the whole space from the top of the shoulder to the fourth rib,—being, only, more distinct anteriorly and under the axilla than behind. The murmur of respiration was sufficiently distinct over the greater part of the chest, except at the roots of the right lung and the top of the left. The Hippocratic succussion afforded no result. From these various signs I made the following diagnosis: *Vast tuberculous cavity occupying the whole of the superior lobe of the right lung, and containing a small quantity of fluid; tubercles, especially at the top of the left and root of the right lung.* Four days after her entry this woman was discharged for irregularity. She came into the hospital again in the end of May, affected with precisely the same symptoms. She died suddenly on the 6th of June.

Dissection twenty-four hours after death. On penetrating with the scalpel between the fourth and fifth ribs of the right side a small quantity of air escaped.* The lungs on this side were flattened from within outwards towards the ribs, and adhered throughout to the pleura of the ribs, mediastinum and diaphragm. Above the sixth rib the adhesion was very close. The upper half of this lung was occupied by a vast tuberculous cavity, which contained about two spoonfuls of a purulent fluid. The parietes of this excavation (except on the lower side) consisted of condensed pulmonary tissue, surrounded by a thin layer of a fibrous texture like the lateral ligaments of the joints, which was intimately connected with the pleura of the ribs and lungs. The cavity was large enough to contain the hand of the largest man, and branched out into many anfractuosities. This cavity was crossed at one point by a band of flaccid pulmonary tissue, pretty healthy, and covered by the lining membrane of the excavation. Here and there, blood-vessels of the size of a crow-quill ramified on the interior of this, some adherent and others partially detached,

* This must have come from the excavation which will be immediately noticed, as the cavity of the pleura was obliterated.

some quite obliterated, others only partially. A semi-cartilaginous membrane, extremely uneven and of very variable thickness, lined the cavity throughout; and this was the only boundary, on the inferior part, between it and a branch of the pulmonary artery large enough to admit the little finger. The anterior part of this excavation terminated in a longish cul-de-sac, which was lined by a membrane entirely cartilaginous, and much thicker than that of the other parts of it. In cutting this part of the lung from above downwards, we could trace this cartilaginous lining under the form of a lamina of cartilage, for more than an inch into the substance of the lung, beyond the walls of the excavation. This was no doubt the remaining cicatrization of a cavity which had communicated with that which existed at present. Some bronchial tubes that stretched towards this lamina terminated in culs-de-sac before reaching it, still, however, retaining a considerable caliber, and having their mucous membrane very red and thickened. Several other branches of the bronchia opened into the existing cavity, with their terminations quite smooth and polished.

The anterior portion of the superior and middle lobes, which had not been implicated in this destruction, was still crepitous, and contained, in different parts, small groupes of tubercles in different stages, as did also the lower lobe.

On puncturing the left side of the chest there was an escape of gas, which must have come from the cavity of the pleura. There was no effusion in this side of the chest, and the greater part of the lung was unattached, except at its very upper point. This was strongly attached to the costal pleura by a very thick, whitish, fibrous membrane. This covered a sort of cartilaginous cicatrice in the lung, of two or three lines in thickness, which surmounted an irregular cavity of the size of a pigeon's egg. The walls of this were formed by condensed pulmonary substance and

inclosed a small calcareous concretion. The remaining parts of this lung were pretty sound, only containing some tubercles.

Case. (No. xxxvii. of the Author, not translated in the body of the work). Phthisis Pulmonalis.—*Tuberculous excavation producing the metallick tinkling.* A woman, aged 40, came into the Hospital 29th January, having been affected with cough for five months, and which had increased since her confinement, three mont s ago. At this time the respiration was short and quick, and difficult; the chest resounded pretty well in the back and left side before,—but better on the right side; there was distinct pectoriloquism near the junction of the sternum and left clavicle, and the same phenomenon, but less distinct, on the same side where the arm joined the chest; the sound of the ventricles was dull, and the heart gave hardly any impulse. Two days after, by means of the cylinder, we distinguished a sound resembling fluctuation, in the left side, when the patient coughed, and the *metallick tinkling* when she spoke. Succussion of the trunk did not produce the sound of fluctuation. From these results the following diagnostic was given: *very large tuberculous excavation in the middle of the left lung, containing a small quantity of very liquid tuberculous matter.* The patient died five days after this.

Dissection twenty-fours after death. In the right lung, through its whole extent, there were innumerable tubercles of a yellowish white colour, and varying in size from that of a hemp-seed to a cherry-stone, and even a large filbert. These last were evidently formed by the reunion of several smaller ones, and, for the most part, were more or less softened. Besides these there were, in other parts, several cavities, the largest of which would have contained a hazel-nut, completely filled by pus, thicker than that of an abscess, and lined by a double membrane, the inner layer of which was white, soft, and little adherent to the other;

the outer was of a cartilaginous character and semi-transparent, and incomplete in certain points. The left lung adhered closely to the pleura of the ribs and pericardium. On its anterior and lateral part it contained, near its surface, three cavities, one above the other, and communicating by two large openings. The upper, of the size of a pigeon's egg, occupied the top of the lung, and corresponded to the junction of the clavicle and sternum; the second might have contained a pullet's egg, and the lowest, which reached within an inch of the base of the lung, was of the size of a walnut. These excavations were lined by two membranes, like those in the right lung, contained a liquid pus, and communicated with several bronchial tubes. This lung contained also some smaller cavities and tubercles, and exhibited marks of inflammation in several places.

Case 1. Page 19. (No. i. of the Author). Phthisis Pulmonalis. *Ulcers of the lungs cured by transformation into semi-cartilaginous fistulæ.* A woman, aged 68, had been for several years affected with much cough and expectoration; accompanied by habitual shortness of breath, greatly aggravated by the least exercise. In other respects she was pretty well, and was able to discharge the laborious duties of a servant. She was sufficiently stout and had good appetite; but her lips and cheeks were of a violet red colour. On the last day of December she was seized with fever, very severe dyspnœa, and cough attended by very viscid frothy sputa, of a pale green colour and semi-opaque. She was bled, and thereby obtained some relief. Four days after this attack she was removed to the hospital, and presented the following symptoms on being examined by the stethoscope:—Respiration was barely perceptible (and was accompanied by a well-marked *rattle* in the inferior and left part of the chest) to the height of about the fourth rib. Percussion elicited a dull sound over the same extent, especially on the back. The pulsation of

the heart gave no shock, but was perceptible over the whole anterior and lateral part of the chest, and slightly on the left side of the back. The contraction of the auricles and ventricles produced a considerable sound, and nearly equally so. The external jugulars were swollen. The dyspnœa and expectoration were as stated above. On these data the following diagnostic was given: *Peripneumony of the inferior part of the left lung: slight dilatation of the ventricles.*

Fresh bleedings gave temporary relief; but on the eighth day the fever increased and was attended by stupor and delirium. At this time respiration was much more perceptible on the upper part of the left side than any where else; and naturally led us to suspect the existence of pectoriloquism there: but the patient was too weak to have this tried, and died the following day.

Dissection twenty-four hours after death. The lungs adhered to the costal pleura, nearly through their whole extent, by means of well organised cellular substance, evidently of antient date. The right lung was crepitous and very sound, exclusive of the upper lobe, which contained an excavation of the size of a large filbert. This was lined by a thin smooth, equable membrane, pearl-grey, and of a semi-cartilaginous nature. Several bronchial tubes opened into this, extremely dilated, so as, at first sight, to look like appendices of the cavity. The mucous membrane of some of these tubes was very pale, and that of others red, but not swollen. The top of the left lung contained a similar cavity, only larger and more irregularly shaped. It was lined by a similar membrane, which was continuous with the mucous coat of a great number of bronchial tubes (large as a crow-quill) which opened into it. It contained merely a small portion of nearly colourless serosity. The substance of the lungs around these cavities was sound and crepitous; except in the places where some of the projecting angles came nearly in contact, in which

cases the intervening substance appeared like a compound of fibro-cartilage and black pulmonary matter. There were no tubercles whatever in the lungs; but the whole of the inferior lobes, and the lower portion of the superior, had a consistence equal to that of liver, which, when cut, exhibited a granulated surface, and poured out a purulent fluid intermixed with blood.

The heart was somewhat larger than natural, and was filled with coagula. The right ventricle, in particular, was evidently enlarged, and both of these were thin, especially the right.

Case 3, Page 20. (No. iii. of the Author). Phthisis Pulmonalis. *Ulcer converted into semi-cartilaginous fistula.* A woman, aged 40, had been long subject to much cough, and dyspnœa, varied by temporary aggravations, especially by certain states of the weather. These symptoms, which she called Asthma, had not incapacitated her for labour, until the last fifteen days, at the end of which time she came into hospital. At this time she could not at all lie down,—the respiration was very short and difficult, the lips violet, and there was anasarca of the lower limbs. The chest yielded, on percussion, a pretty good sound throughout, though, perhaps, somewhat less than natural. Immediately below the clavicle on each side, the cylinder discovered a well-marked *rattle.* The thoracic parietes were much and forcibly elevated at each inspiration. The cough was very frequent, and followed by expectoration of opaque yellow sputa. Pectoriloquism was not discoverable. The pulse was frequent, small, and regular; the external jugulars were swelled and distinctly pulsative; the pulsations of the heart (examined by the stethoscope) were deep, regular, little sonorous, and without impulse to the ear. From this examination I thought myself justified in considering the heart as sound, notwithstanding the contrary indication afforded by the general symptoms; and accordingly gave my diagnostic—*Phthisis without disease*

of the heart. A few days after, the contraction of the ventricles gave some impulse, a symptom which, taken along with the pulsation of the jugulars, gave reason to suspect slight hypertrophia of the right ventricle. The symptoms, especially the anasarca, got gradually worse; and she died on the 19th of February. The day before her death evident pectoriloquism was discovered in the anterior third of the fourth intercostal space, on the right side, a point which had not been examined before.

Dissection. The heart was of a natural size. The right ventricle was perhaps a little thicker than natural; and there was an ecchymosed spot, the size of the nail, on the inner surface of the pericardium. There was about a pint of serum in the left side of the chest, and the lung was attached to the costal pleura, at its top, by short cellular adhesions. In this point there were several radiated linear impressions depressed in the point of their union. These impressions corresponded to three or four laminæ of condensed cellular substance traversing the substance of the lung. In the same place there was a dozen of tubercles in different stages, and one small excavation of the size of a filbert, lined by a soft membrane, and filled by softened tuberculous matter. The rest of this lung was crepitous and gorged with blood.

The right lung adhered firmly, throughout its whole extent, to the costal pleura. Immediately opposite the fourth intercostal space, and at the depth of half an inch, there was a cavity the size of a walnut. It was lined by a semi-cartilaginous membrane, of the kind so often already described, and contained a small portion of a yellowish pus. A bronchial tube opened into this on the inferior side, of the size of a crow-quill, but partially obstructed by a small chalky concretion which lay loose in it. There were seven or eight similar concretions in other parts of the lung, two of which, situated immediately under the

pleura, were of the size of prune-stones. The lungs were in other respects sound.

CASE 4, Page 20. (No. iv. of the Author). PHTHISIS PULMONALIS—*cured by the conversion of an ulcerous excavation into a fistula.* A lady, aged 48, of a good constitution and healthy, with the exception of a local disease, until her thirtieth year, when she became subject to very severe pulmonary catarrhs, several of which confined her to bed for two or three months, and produced considerable emaciation. Subsequently to one of these attacks she had a diarrhœa, which was at length checked with great difficulty, but her bowels continued lax for several years. After being long without an attack of catarrh, and in very good health, she was, in the beginning of 1817, attacked with a distressing cough, attended by a slight watery viscid and colourless expectoration. I saw her in July, at which time she was considerably emaciated, and, though still able to attend to her occupation, weak and languid. The pulse and skin were not uniformly febrile. Respiration was very perceptible over the whole chest, but less distinctly at the top of the right lung. From this, and the nature of the expectoration, I considered her as having tubercles in an early stage, and applied leeches, &c. The symptoms continued nearly the same throughout the summer and part of the winter. In the end of February, 1818, the cough became suddenly loose, and the patient began to have thick yellow puriform expectoration. This state of the sputa lasted a month, when the cough in a great measure left her and became nearly dry. I did not see the patient during this attack, which she looked upon as a cold; but I visited her in the beginning of April, and upon examining her chest I found most distinct pectoriloquism at the anterior and upper part of the right side. I was convinced by this that the supposed catarrh had been the discharge of the softened tuberculous matter. The sound of respiration was good over the whole chest; and even

in the vicinity of the pectoriloquous spot; the pulse was not frequent and the heat moderate. On this account I entertained hopes of her recovery and prescribed ass's milk. The cough and expectoration progressively lessened, the flesh and strength returned; and, in the beginning of July, my patient had regained every appearance of the most perfect health, although the pectoriloquism still continued most distinct, beneath the anterior part of the second rib on the right side, in a space of about an inch square.

During the succeeding winter this lady had an attack of catarrh, but it lasted only fifteen days and was not severe. In other respects she bore the winter well, and she continues (1819) in good health, though still pectoriloquous in the same degree. Her pulse is rather slow, and she has little cough and less expectoration.

Case 6, Page 25. (No. vi. of the Author). Phthisis Pulmonalis. *Antient cicatrice in the lungs in a patient dead of pleurisy and peritonitis.* A man, aged 65, came into hospital on the 29th of November, affected with slight pulmonary symptoms, chiefly marked by dyspnœa, to which he had been long subject, and which he considered as Asthma. Percussion afforded no result, owing to the excessive fatness of the individual; only the chest appeared to sound somewhat less below the right clavicle. Respiration was inaudible over the whole of the right side, but was very sonorous on the left. From these results I considered this person as affected with a latent peripneumony of the right lung.

Five days after this, there was observed slight œdema of the right side of the chest; and on applying the stethoscope to the back, respiration was somewhat perceptible along the edge of the spine on the right side, though less so than on the left. There was very little cough, and scarcely any expectoration. These symptoms indicating pleurisy rather than peripneumony, necessarily modified

our diagnostics. After a few days the oppression became less, and we began to hear the sound of respiration, in a slight degree, below the right clavicle; and hægophonism (see page 336) was perceptible in the same spot for a few days. On the eleventh the chest sounded still better in this point, and respiration became distinct as in the opposite side, but was not perceptible lower than the third rib. It was, also, sufficiently distinct between the spine and scapula. At this time the patient expectorated some opaque, yellow, puriform sputa. The symptoms continued much the same until the middle of February, when he died, apparently from an attack of peritonitis.

Dissection twenty-four hours after death. The cavity of the right pleura contained about a pint of yellow and somewhat turbid serum. The lung of the same side adhered to the diaphragm and posterior part of the chest by a strong, short and well-organised cellular tissue. On the anterior surface of the lung, there was a false membrane about the size of the palm of the hand, soft, opaque, yellowish, of a consistence inferior to that of half-concrete albumen, and appearing, at first sight, like the matter of thick puriform sputa. This patch was traversed by numerous blood-vessels, and adhered to the costal pleura by a lamina of greater consistence, also very vascular, and approaching more to the texture of cellular substance. Above and behind another firm albuminous crust, yellow and vascular, attached the lungs to the pleura.

The substance of the lung was sufficiently crepitous in the upper portions, although somewhat injected with a bloody serum. Its lower portions were more compact, of a deeper red, and, in spots, somewhat granular on incision; it was also gorged with fluid, and less crepitous than the upper portions.

The left lung adhered to the pleura, at its summit, by means of old cellular attachments. In this point there was an irregular depression, in the centre of which lay a small

ossification. From this point could be traced into the substance of the lung a band of very white cellular tissue, very dense, yet scarcely amounting to the consistence of a membrane. This band was about an inch long, six lines broad, and three or four thick. Its white colour formed a striking contrast with the natural pulmonary tissue. Some bronchial tubes of the size of a crow-quill, or larger, terminated and became lost in this band. An accidental circumstance prevented me from examining this substance more minutely. The pulmonary substance was crepitous throughout, and there were no tubercles in either lung. The pericardium contained a few ounces of limpid serum, and the heart was larger than the hand of the individual. The parietes of the left ventricle were about eight lines thick at the origin of the columnæ, and six lines at the base, and were very firm; the cavity of the ventricle was very small.* The right ventricle seemed small, but its parietes were of natural thickness. The peritoneal coat of the intestines was inflamed.

Case 7, Page 26. (No. vii. of the original). Phthisis Pulmonalis. *Antient fibro-cartilaginous cicatrice of the lung, in a person dead of Peripneumony.* A man, aged 62, had been affected five years with an habitual cough, but was otherwise of a good constitution. On the 4th of April 1818, he was suddenly seized with acute pain in the lower part of the left chest, which soon extended over nearly the whole side, attended by difficult and painful respiration, and inability to lie on the affected side. He came into hospital on the 8th, and exhibited the following symptoms:—general paleness, left cheek slightly coloured, lips bluish, external jugulars swelled, pulse weak and frequent, breathing short, loud, and painful, and with the

* This well-marked case of hypertrophia had not been suspected, although the heart had been examined several times by the stethoscope, owing to the existence of the disease in the lungs, which masked the symptoms. —See Page 371.

mouth extended, cough not very frequent and by fits, expectoration scanty, very viscid, frothy, semi-transparent, and intermixed with some yellow and opaque sputa.

Percussion yielded a very good sound on the right side, but not so good on the left. Respiration (by the cylinder) was quite inaudible in almost the whole extent of the left side, whilst on the right it was strong, and attended by a rattle and sort of hissing sound. The pulsations of the heart were regular. The contraction of the auricles was sonorous and heard distinctly below the clavicles.

The paleness of this man, and the cough to which he had been so long subject, leading to the suspicion of tubercles, we examined the chest in several points with the view of discovering pectoriloquism, but did not find it. From these results the following diagnostic was (provisionally) made: *Pleuro-peripneumony of the left side.—Tubercles? Slight dilatation of the heart?* This man died the following night.

Dissection thirty-six hours after death. The left cavity of the chest was larger than the right. The right lung adhered, throughout, to the pleura by means of antient attachments. On the top of the right lung there was a fibro-cartilaginous mass three lines in thickness in its centre, which formed, in this point, the medium of adhesion to the ribs. The substance of the lung was very crepitous anteriorly, but little posteriorly, in which part it was flaccid and much injected by very fluid blood. This lung was also marbled by a great number of spots formed by black pulmonary matter. [The morbid appearances in the lungs indicating the cure of tuberculous excavations in this case are detailed in the treatise, pages 27 and 28.] In its anterior quarter the left lung was crepitous, but the remaining part was of the consistence of liver, and exhibited the characters of lung in this degree of inflammation (see page 45). The base of this lung adhered to the diaphragm by its whole border; and in its centre there was a patch of

concrete lymph of the consistence of white of egg. It was easily separated from the pleura of the lungs, which appeared redder than natural.

The inner surface of the pericardium, where this membrane is attached to the diaphragm, was of an intense punctuated red for the space of a square inch. The pericardium contained about two ounces of a very bloody serum, and two or three flakes of half-concrete lymph. The heart was larger than the hand of the subject, and exhibited on its anterior surface a white spot of a cellular character, of the size of the nail. The right ventricle was larger than natural, of the usual thickness, but yellowish and of a flaccid texture. The left ventricle was evidently dilated, and it was only four or five lines thick; its texture was soft and pale like the right.

CASE 14, Page 58. (No. xvi. in the original). GANGRENE OF THE LUNGS. *Pleurisy and pneumo-thorax consequent to the bursting of a gangrenous abscess of the lungs.* A labourer, aged 42, subject for six years to occasional attacks of severe pains of the chest, &c. for which he had been several times in the hospital, began to have cough, with copious and extremely fetid expectoration, in the beginning of April 1818; which symptoms continuing, he came into the hospital Necker on the 30th of May following. At this time he exhibited the following symptoms: moderate degree of fatness; decubitus practicable on either side, but more easily on the left; cough frequent, and usually by fits; expectoration copious, yellow and opaque; respiration very distinctly audible on the right side, much less on the left, and accompanied with a mucous rattle; resonance on percussion somewhat less on the left side both before and behind. Action of the heart natural. After the examination the following *diagnosis* was given: *Slight chronic peripneumony, occupying the centre of the left lung.*

On the 7th June, the respiration was still very distinct on the right side, but on the left it was quite inaudible except at the top of the chest, where, however, it was much weaker than formerly,—and at the roots of the lung, where it was much more distinct than formerly. The left side sounded still worse on percussion than at first. These results induced me to add to my former diagnostic :—*the peripneumony has begun to resolve towards the root of the lung; but there has supervened a pleurisy, with sero-purulent effusion, of the left side.* On the 12th the respiration was very slightly perceptible below the left clavicle; and on the 16th it could scarcely be at all distinguished over the whole anterior and superior half of this side of the chest; but the resonance, on percussion, had again become very distinct over this space. From this last sign I added to the diagnostic—*Pneumo-thorax.* There was now much cough, and the expectoration was copious, opaque and ropy. On the 17th the pain, which had left him since April, returned very severe, between the fifth and sixth ribs of the left side. On the 1st July the sound of respiration was quite extinct over the left side. 3rd, Resonance of the chest equal on both sides; respiration very distinct on the right, not at all on the left side, either before or behind, except at the roots of the lung, and perhaps a little under the clavicle. The pain and cough being more violent, he expectorated in the space of a few minutes half a pint of yellow opaque purulent sputa. This kind of expectoration continued for some days, with increase of pain and dyspnœa. Pectoriloquism, sought for in several points, was not discovered*. This man died on the 31st.

Dissection twenty-four hours after death. [For this see the work, page 59].

Case 16, Page 67. (No. xxxvi. in the original). Hæmoptysis. *Pulmonary Apoplexy in a subject affected with*

* Neither was the *metallick tinkling* observed. The hippocratic succussion was not tried.

hypertrophia and dilatation of the heart. A labourer, aged 45, subject for several years to a feeling of suffocation on using violent exercise, came into the hospital in the end of August, on account of his dyspnœa having become greater and more permanent during the preceding fortnight. At this time, there was no emaciation, but the face was pale; the feet and legs were œdematous, and the pulse was scarcely perceptible in both arms; there was no appetite, and the sleep was frequently interrupted by sudden startings. The respiration, though short and impeded, was very audible by means of the cylinder. The chest sounded well throughout, except in the region of the heart; and the exploration of this organ by the cylinder gave the following results:—impulse of the left ventricle very strong and sonorous; sound and impulse of the right ventricle middling; sound of the auricles quite imperceptible. In consequence of this the diagnostic was given—*Hypertrophia of the heart.* (V. S. & Aperients.) In a month's time the patient finding himself better left the hospital; but he returned in another month, with precisely the same symptoms, which being again relieved, he left the hospital a second time after six weeks' stay.

On the 16th of January he once more returned to the hospital. At this time the difficulty of respiration was very great, especially when lying on the back; it was relieved by bending forward and by lying on the belly; in this last position he felt a pulsation in his throat opposite the top of the sternum. The œdema was increased, and he had cough and diarrhœa, with a pain in the epigastrium. The heart still gave a very strong impulse, and the pulse continued imperceptible. The symptoms continued much the same until the 4th of February, when he was seized with hæmoptysis. At this time the chest yielded a good sound throughout; but the respiration was nearly inaudible over the inferior portion of the right side. Nearly over the whole chest, a mucous rattle (apparently with very large

bubbles) was heard, and more strongly on the right side. He died on the 8th.

Dissection sixty hours after death. The pericardium contained nearly an ounce of serum. The heart was, at least, thrice the natural size. It had on its surface several irregular white spots, half as large as the palm of the hand. The right ventricle was partly, and the right auricle entirely, filled by a very firm polypus, which, in some places, showed some traces of vascularity. This ventricle was in other respects natural, except that its columnæ were flattened, and that it contained near its apex two or three of those bodies which I have named *globular excrescences.* The auricle was natural.

The left ventricle was from nine to eleven lines thick, and of a remarkable degree of firmness; its parietes did not at all collapse when laid open, although the cavity was at least double the natural size, being capable of containing the fist. The columnæ carnæ were very large and very strong. The mitral valve contained several cartilaginous indurations, but retained its shape: the sigmoid of the aorta were sound. On the inner surface of this ventricle there were one or two white spots of the size of the nail, apparently situated beneath the lining membrane. The aorta was slightly dilated at its origin, and more so in the arch, and was otherwise diseased, containing many cartilaginous and bony incrustations.

The morbid appearances found in the lungs are detailed in the work, page 67.

Case 26, Page 105. (No. xxxiv. of the original). Œdema of the lungs *supervening in the convalescence from peripneumony.* The only thing of any importance omitted in the abridgment of this case, given in the body of the work, is the account of the signs of diseased heart afforded by percussion and auscultation, and the morbid appearances found in this organ: I shall now briefly notice these. When she came into the hospital, in addition to the symp-

toms mentioned, it is stated that "the resonance of the chest is not good on the right side behind, and the left side before; this resonance is quite wanting in the region of the heart; and the respiration, as explored by the stethoscope, is inaudible in these points. The action of the heart gives scarcely any impulse, but yields a distinct sound." In consequence of these, and the other symptoms mentioned in the work, the diagnostic was given—*Partial peripneumony of both lungs, and dilatation of the heart without hypertrophia.* The morbid appearances in the lungs are detailed in the work. The following are those observed in the heart:—The pericardium contained about two ounces of serum. The heart was larger than the hand of the individual; it was soft and easily torn, and its cavities were very large.

Case. (No. xxiv. of the original, not translated in the body of the work). Pleurisy. *Pleurisy with hægophonism, cured.* A man, aged 42, came into the hospital the 23rd of April. Six years before he had had an attack on the chest attended by a severe stitch in the left side; and he had a similar attack in the spring of last year. Ever since his first seizure he had been subject to colds, especially in winter; and during the last year his cough had been almost constant. During the four days preceding his entry into the hospital he suffered from stitch in the left side, dry cough, impeded respiration, and fever. On coming into the hospital he exhibited the following symptoms: cheeks very red, pulse frequent, skin hot, decubitus on the left side impracticable, very acute pain in the left side. The respiration very distinct, and even loud, below the left clavicle, and as low as the fifth rib on the same side anteriorly,* of moderate intensity below the axilla, but very indistinct behind, especially on the lower parts, where it is

* It would seem probable from this that there was adhesion between the ribs and summit of the left lung, the consequence of some of the preceding attacks of pleurisy.

accompanied by a slight *crepitous* (almost *mucous*) rattle. On the right side the respiration is less perceptible below the clavicle than on the left side; behind, and below the axilla, it is very distinct but not strong. On percussion the chest sounds, perhaps, somewhat worse below the right than the left clavicle; but behind, and below the axilla, it sounds much less on the left than right side, particularly on the lower parts: this difference of sound is perceptible even over the scapulæ. *Hægophonism* is extremely evident about the point of the left scapula and all along its inner edge. The patient's voice appears as if it traversed a trumpet and not the tube of the stethoscope. Hægophonism is also perceptible below the axilla, and as high as the fifth rib, but less distinctly. In consequence of these signs the following diagnosis was given: *Pleurisy of the left side, complicated with a slight degree of peripneumony.** (Venesection.)

24th. Fever still high,—continued incapacity to lie on the left side,—almost constant cough, with liquid semi-transparent sputa, which adhere but slightly to the vessel; respiration distinct on the left side anteriorly, as low as the fifth rib,—quite imperceptible over the whole of this side behind, (where it is replaced by a mucous and slightly-crepitous rattle,) but very distinct on the side as low as the seventh rib. Hægophonism not discoverable on the upper and anterior parts, where the respiration is still perceptible,—doubtful below the fifth rib,—but most distinct over the whole of the back. Near the angle of the scapula the patient, when speaking, seems to blow into the tube of the cylinder; and in breathing, seems to inspire and expire by the same. Nothing of all this is perceptible on the right side, where the respiration is very distinct throughout. The hægophonism becomes less distinct when the pattent lies on his face.—I concluded from these signs

* The latter part of the diagnostic was founded entirely on the existence of the *crepitous rattle.*

that the left lung was compressed upwards and laterally, in which points it was probably attached to the ribs. (*Eight leeches to the side.*)

25th. Results the same, only the respiration more easy. Sputa adhering to the vessel*. (*Eight leeches to the anus.*)

26th. Pain of side nearly gone, cough much less, expectoration more easy and sputa more yellow and opaque, pulse less frequent. The patient slept well. (*Small bleeding.*)

27th. Fever nearly gone, respiration easy, no pain of side. Respiration more distinct on the left side, and hægophonism much less evident. Respiration very distinct over the whole right side. (*Blister to the side.*)

28th and 29th. Much the same,—still much cough, but expectoration easy, the sputa partly frothy and semi-transparent, partly yellow and opaque; can lie on either side.

May 1st. Still better. Hægophonism still evident, but less strong, along the whole inner border of the scapula, and over the whole of the left side behind; but the respiration, which had hitherto been merely *bronchial* over the site of the hægophonism, is now possessed of the usual pulmonary character; it is perfectly and forcibly audible on the side, except in the lower parts, where it is much feebler.

The patient continuing to amend daily, the hægophonism became propressively less distinct and ceased entirely on the 8th; the respiration became very distinct over the whole of the left side, though, probably, scarcely so loud as in the other.

Case. (No. xxv. in the original, not translated in the body of the work). Pleurisy. *Chronic Pleurisy of the left side, with ascites and organic disease of the liver.* A man had had an attack in the chest when 24 years old;

* Sign confirming the complication of peripneumony.

but afterwards enjoyed very good health, until the summer of 1818, when he became slightly anasarcous, and this was followed in December by cough. He came into the hospital on the 13th of the following March, in his 47th year. At this time he presented the following symptoms: moderate œdema of the feet and legs, slight expectoration, partly white and frothy, partly yellow and opaque; the chest sounds equally well throughout, and the respiration (on a hasty examination) seems scarcely perceptible on both sides.

17th. The chest, on a more careful examination, gave the following results: The left side behind seems to sound worse than the right,—both sides laterally yield a very dull sound,—the anterior superior parts sound better. The respiration is very distinct over the whole of the right side; on the left, on the contrary, it is but very little perceptible below the clavicle and at the roots of the lungs, and not at all audible over the remaining parts of this side. The following diagnosis was given: *Imperfectly cured pleurisy of the left side, coexisting perhaps with tubercles.*

In the end of March the œdema, which had been lessened, now became greater, the belly swelled, and the appetite diminished. At this time, the respiration on the right side was accompanied with a strong and sonorous rattle on the side and anteriorly, and was scarcely perceptible on the same side behind, and over the whole of the left side. Percussion elicited a very imperfect sound from the whole of the left side, except on the anterior superior part; but the whole right side sounded well. Hægophonism existed very distinctly over the supra-spinous fossa of the left scapula. The voice, having the *bleating* character strongly marked, seemed to come through the tube of the stethoscope, and was more acute than the natural voice of the patient. In consequence, I modified the diagnosis as follows: *Chronic pleurisy of the left side, with pulmonary catarrh.*

From the 30th March to the 15th April, the repeated examination of the chest showed that on the right side, the sonorous rattle had in a great measure ceased, and that the respiration was louder than natural, and marked by the peculiar sound which I have denominated *puerile ;* whilst, on the left side, the respiration seemed extinct, except along the inner border of the scapula and immediately below the clavicle, in which places it was just barely perceptible. The point just mentioned (under the clavicle) was the only one on this side which yielded any sound on percussion. During the first days of April, hægophonism was still audible along the inner margin of the scapula, but the voice had assumed a grave key, and was heard better with the stopper of the tube removed,—it disappeared entirely on the 5th. The natural respiration was short and somewhat noisy. The patient lay usually on the left side, sometimes on the back, but he could not lie on the right side. About the middle of the month the respiration seemed more easy, and the patient could lie two or three hours on the right side; but the anasarca increased, and hectic fever came on.

From the 7th to the 14th of May, the resonance of the chest became clearer on the anterior and upper part of the left side, and the respiration became more audible in the same point; it was also somewhat perceptible below the axilla, and was here accompanied by a pretty strong mucous rattle: in every other part of this side both the resonance and the respiration were wanting. He died on the 17th.

Dissection thirty hours after death. The thorax appeared larger on the upper part, and smaller on the lower part, of the left side, than the right. The left cavity of the pleura contained at least two pints of a very bloody serum, and the lung, on this side was thereby compressed towards the mediastinum and upper part of the chest. A large vacant space was thus left between the lung and ribs, which space

gradually lessened from below upwards, but was still an inch in diameter as high as the middle of the scapula. This space was lined by a false membrane, the internal surface of which was tinged uniformly of a bright scarlet colour, and was crossed in every direction by fine fibrous bands of the same kind. In many parts of these false membranes there were clots and thin layers of a dark-coloured blood. The under layer of membrane which adhered to the pleura was of a greyish yellow colour, homogenous, and of a structure and consistence resembling the fibro-cartilages. It contained within it an immense multitude of greyish tubercles, of a size from that of a millet-seed to a grain of corn, or even a pea. These were of a firmer consistence than the including membrane; and they formed more than one half the whole of its substance.

The left lung, compressed as already mentioned, was reduced to nearly one-fourth of its natural size; it was adhering to the pleura by its inner side, its summit, and by two-thirds of its exterior aspect superiorly. Detached from the false membrane it was sound, only compressed, flaccid, and void of air except in its lower lobe. The blood-vessels and smaller bronchial tubes were flattened and much contracted.

The right lung adhered to the ribs only in a few points, and by old and perfectly organised attachments. It was gorged with a great quantity of frothy serum which flowed out on its being cut.

The cavity of the peritoneum contained five or six pints of serum. The liver was reduced to one third of its usual size, and when cut into was found to be entirely composed of a multitude of small grains, of a round or ovoid shape, and varying in size from that of a millet-seed to a hemp-seed.

Case. (No. xlv. of the original, not translated in the body of the work). *(Supposed) Ossification of the mitral valve.* A strong muscular young man, aged 16, came into

the hospital complaining of oppression on the chest and palpitation; symptoms which had seized him suddenly, together with hæmoptysis and epistaxis two years before. These symptoms were relieved at the time, by rest; but returned as often as he made any considerable degree of exertion. He presented the following symptoms on coming into the hospital: respiration and resonance good over the whole chest; the hand, applied to the region of the heart, feels the pulsation strongly, and accompanied with the *purring* sensation mentioned in the treatise (page 357). This vibratory sensation is not continuous, but returns at regular intervals. The stethoscope, applied between the cartilages of the fifth and seventh ribs, gives the following results:—contraction of the auricle extremely prolonged, accompanied with a dull but strong sound exactly like that produced by a file on wood. This sound is attended by a vibration sensible to the ear, and which is evidently the same as that felt by the hand. Succeeding this, a louder sound and a shock synchronous with the pulse point out the contraction of the ventricle, which occupies only one fourth the time, and has something harsh in its sound. Under the lower end of the sternum the contractions of the heart are quite different. Here the impulse of the right ventricle is very great, its contraction accompanied by a very distinct sound, and being of the ordinary duration—viz. twice as long as that of the auricle. The sound of the auricle is somewhat obtuse, but without any thing analogous to the vibratory character of the left.

The action of the heart is audible below both clavicles, on both sides,—(but feebly, especially on the right)—and over the whole sternum. On the right side and below the left clavicle, the contractions of the heart have the same rythm as at the end of the sternum. On the left side, on the contrary, the whizzing sound of the left auricle already described is much feebler than in the left precordial region. From these signs the following diagnostic was given;

Ossification of the mitral valve, slight hypertrophia of the left ventricle; perhaps slight ossification of the sigmoid valves of the aorta? great hypertrophia of the right ventricle.

The pulse, in this case, was pretty strong and very regular, and all the functions natural, only the sleep was habitually disturbed by frightful dreams, and the lad could not use any severe exercise, nor even walk rather fast, without being attacked by strong palpitations and a feeling of suffocation.

Four venesections, after intervals of a few days, gave much relief. After the first, the pulse became weak; and immediately after each bleeding the *purring vibration* became imperceptible to the hand, and the whizzing of the auricle changed from the sound of a *file* to that of a *bellows*, the valve of which we keep open by the hand; but the shock of the right ventricle continued to be very strong. This patient left the hospital after a month.

Case 43, Page 246. (No. xlvi. of the original). *Excrescences on the mitral valve and left auricle; rupture of one of the tendons of this valve, and hypertrophia, with dilatation, of both ventricles of the heart.* [The general symptoms and appearances on dissection are given in the body of the work; I shall therefore only add the account of the symptoms more immediately indicative of the disease in the heart.]

The pulsations of the heart, examined by the cylinder, give a very dull sound, but a strong impulse on both sides:—they are heard a little in the back. During the contraction of the left auricle (which is almost as much prolonged as that of the ventricle) a sound resembling that of bellows is perceptible. The *purring sensation* is very distinct on applying the hand over the cartilages of the sixth and seventh ribs. The action of the heart is, in some other respects, irregular; the jugulars are swollen; the respiration is distinct over the whole chest; the pulse is hard,

small, and very regular; the breath is rather short. After this examination the following diagnostic was given: *Hypertrophia of both ventricles; excrescences or cartilaginous contraction of the mitral valve.*

Case. (No. xlviii. of the original, not translated in the body of the work). Double Peripneumony *with Pericarditis.* A man, aged 30, who had been subject to a slight cough for some years, and latterly, to dyspnœa, came into the hospital on the 30th January, apparently affected with pulmonary catarrh. (*V. S.*) On the following day the difficulty of respiration suddenly increased, the pulse became irregular, and the sputa were viscid. To relieve his breathing the patient sat upright. (*V. S. & Leeches.*)

February 1st. Orthopnœa much relieved. Pulsations of the heart very irregular, both in frequency and force; contractions of the ventricles sonorous, and the impulse considerable, but the pulse extremely small and feeble; resonance of the chest middling, perhaps less in the back and region of the heart; respiration in the back very little perceptible and accompanied by a slight crepitous rattle. Diagnostic: *Pericarditis, with peripneumony of the posterior part of both lungs**. 2nd and 3rd.—Much the same. (Eight leeches each day).

4th. Orthopnœa returned. Contractions of the heart very feeble and unequal; sound of the auricles inaudible; impulse of the ventricles pretty strong and without noise; the action of the heart seems confined to a small point on the parietes of the chest; pulse nearly imperceptible. (Eight leeches).

5th. The same. (Blister to the region of the heart).

6th. Heart and pulse as before; respiration very audible

* I founded my opinion of pericarditis on the circumstance of the forcible action of the heart coinciding with the extremely feeble pulse, and on the irregularity of the heart's action in a man who appeared to have had no previous symptom of this kind.

over all the anterior and lateral parts of the chest, on the back it is scarcely perceptible and accompanied by a more distinct crepitous rattle than before.

For several succeeding days the patient was obliged to sit up constantly in his bed, with his head bent forwards, and immoveable, for fear of increasing the orthopnœa. Respiration very perceptible anteriorly and on the sides, and accompanied from time to time with a rattle which was rather mucous than crepitous, and much more marked during respiration than inspiration*; posteriorly the respiration was quite imperceptible. Cough frequent, with scanty expectoration; sputa transparent, somewhat frothy, and so tenacious as to adhere to the vessel when this was reversed. Pulsations of the heart difficultly analyzed, owing to their frequency; one strong pulsation followed by three or four gradually decreasing in force; pulse feeble and intermitting. A sound like the fluctuation of a liquid heard momentarily in the region of the heart; which sound seems occasioned rather by strong inspirations than the actions of the heart. Lower extremities œdematous, no sleep. (Soap-pills, cautery on the left side.)

13th. Orthopnœa still greater; sputa almost entirely sanguinolent; respiration less distinct on the sides; impulse of the heart still strong. He was again bled, and thereby much relieved.

14th. Sputa less sanguinolent, but orthopnœa greater. (V. S. repeated).

15th. The respiration has become *puerile* on the anterior and lateral parts of the chest, but it is not so distinct as before on the right side anteriorly; a distinct crepitous rattle on the right side. The chest sounds equally well before, and on both sides. Diagnostic: *Peripneumony gains the anterior and lateral parts of the right lung; but remains, on the left, confined to the posterior parts.* He died on the 18th.

* This sign announces the rattle to be in the small bronchial ramifications.

Dissection twenty-four hours after death. The pericardium contained about four ounces of a limpid serum. The walls of both ventricles were thick, but not so as to constitute disease. An irregular white spot was found intimately adhering to the pericardium on each ventricle. The portion of the aorta contained in the pericardium was coated exteriorly with small firm greyish tubercles, resembling the tubercles of the lungs in their first stage. The mitral valve was irregular and contained three or four small semi-cartilaginous tumours.

The cavity of the pleura was entirely obliterated on both sides, by the universal adhesion of the membranes, by means of a short and in most places well-organized cellular tissue, except at their base, where the medium of attachment was a membrane of a greyish-white colour, semi-transparent, of a fibrous texture, and nearly two lines thick.

The lungs, when detached, floated in water, though heavy and large. Their surface was livid, and more so behind. The substance of the lungs was soft and crepitous on their anterior part, to the depth of two fingers' breadth on the right lung, and four fingers on the left; but became propressively firmer and less crepitous on tracing it backwards, until, on the whole of the posterior part, their texture was as dense as liver, of a violet red colour and entirely without crepitation. These portions, when detached, did not float on the water. The hepatization was nearly one third more extended in the right than in the left. The lining membrane of the bronchia was of a reddish brown colour.

The cavity of the peritoneum contained nearly a pint of yellowish serum.

END OF THE TREATISE.

NOTES

BY

THE TRANSLATOR.

Connexion of Tubercles with Inflammation, Page 9.

HITHERTO great confusion has existed in our notions respecting the true character of the appearances found in the lungs after death. Among others, the common notion of consumption being merely the consequence of the suppuration of an inflamed lung, has had a very injurious effect in practical medicine. It is to be hoped that the more correct knowledge now obtained of the true nature of the morbid appearances, will establish a more rational practice. From the anatomical character of tubercular phthisis, it is evident that we have little or nothing to expect from the employment of venesection and other antiphlogistic measures,—or, indeed, from any other;—while the great infrequency of the termination of simple inflammation of the lungs (peripneumony) in abcess, that is—in an irremediable condition of parts,—affords us every chance of this affection yielding to such measures, and therefore justifies their powerful and long-continued application. In a practical point of view, therefore, the present work must be of immense benefit, in settling both the pathology and diagnosis of the diseases of the chest. Any person accustomed to see many cases of pulmonary disease must be struck with the confusion that prevails among medical men respecting them. With many, every chronic affection of the chest is either *Consumption* or *Asthma*, and

the same class of remedies, and regimen, is applied to all. How often are patients sent abroad in a state of health which is utterly hopeless! and how often do we hear of *Consumptions* cured, when the sole *merit* of the curer was ignorance of the nature of the disease!

By far the most valuable remarks yet published in England on this very important matter, of the discrimination of the various diseases commonly classed under the name of *Consumption*, are those in the work of Dr. Armstrong on Scarlet Fever, &c. and in Dr. Abercrombie's paper in the 66th number of the Edinburgh Medical and Surgical Journal. To these two essays I would earnestly call the attention of every practitioner who values either the welfare of his patients, or his success in his professional career. To Dr. Armstrong the profession is already under very great obligations; and the several late papers by Dr. Abercrombie in the Edin. Jour., written in a true philosophical spirit, lead us to anticipate the most important advantages to medicine from his future labours.

Tubercular infiltration of the Lungs, Page 9.

This is noticed by Baillie, Page 76.

Extensive distribution of Tubercles, Page 11.

The extensive distribution of tubercles mentioned by our author, and very generally admitted by other writers, I consider as throwing light on many obscure affections. Is it really true, as MM. Laennec and Bayle assert, that the diarrhœa of consumption is the direct consequence of their presence in the intestinal tunics?

Cicatrization of Pulmonary Fistulæ, Page 16.

Dr. Young, in giving an account of the Historia Anatomica of Lieutaud, notices a case "of a cicatrix found in the lungs, where a consumption had been cured, from Valsalva." Young, p. 225. The facts detailed in this section are extremely interesting; if they destroy the hope

entertained by many, of the curability of consumption in the early stage, they give us hopes, where in general no hope has hitherto existed, in the latter stage of the disease. These facts seem to afford a better reason for sending our confirmed consumptives to warm climates, than could have previously been offered by most of those who were in the habit of doing so.—I have no doubt that many of the readers of this work, of more extensive information than the Translator, can corroborate many of the author's statements by facts adduced from other writers.

Expectoration in Phthisis, Page 37.

For an extensive and minute chemical account of the different kinds of expectorated matter, see Dr. Pearson's papers in the Philosophical Transactions for 1809 and 1810. The question of the mere purulency or non-purulency of the sputa is of very inferior value in a diagnostic point of view, to what it was once considered; since it is now well known that the expectorated matter may be purulent in other diseases besides Phthisis.

Tubercles on the surface of the Peritoneum and Pleura, Page 11.

"In these situations they are found small and very numerous, usually in their first stage, and occasion death by dropsy before they can reach the period of maturation." This is the disease described by Dr. Baron, and is mentioned in many parts of the present treatise. As a cause of dropsy, it must often at once indicate the employment of antiphlogistic measures, and prove their perfect inutility.

Tubercles in the substance of the Vertebræ, or the point of union between these and the Ligaments, Page 11.

In many chronic affections of the spine, in strumous subjects, unattended by curvature, I am disposed to attribute the symptoms to this cause.

Vomicæ, Page 38.

Among others see the work of Dr. Baron on Membranes. I apprehend this author confounds three different diseases under one head.

Peripneumony, Page 44.

All the appearances mentioned by our author in this disease have been noticed by other writers; but he is entitled to the honour of having first ascertained their relations to each other, of having united them all in one connected and distinct view, and fixed their true characters as different stages of the same disease. *Hepatization* of the Lungs is noticed by almost every writer on the Lungs, but its true character has been misunderstood even by some of our best and very recent authors. It is considered as an inflammatory affection in the very short notice of it given by Baillie. But it is singular that it is said to be of such rare occurrence, see Morb. Anat. page 80. See also Hastings on Bronchitis, and many cases in the various medical Journals.

One great advantage of the anatomical knowledge of diseases is, that, whatever system of nosology we follow, in the treatment our ideas will always be attached to some fixed and intelligible condition of parts, the removal of which will form the object of all our remedial measures; while, without this knowledge, we shall be the sport of theory, and combat often *words* in place of things. How often I have heard of *effusion* into the lungs as a frequent cause of death, without being able to attach any precise idea to the expression!

Abscess of the Lungs, Page 47.

The assertions of our author respecting the relative infrequency of this termination of peripneumony is very opposite to the best English authorities. I have no doubt that a great many supposed abscesses have been merely

softened tubercles, as described by our author in the chapter on Phthisis.

In page 38 he states an abscess of the lungs from simple inflammation to be a thousand times less frequent than a case of Empyema.

For some excellent observations on Chronic Peripneumony see Dr. Armstrong's work on Scarlet Fever; also Dr. Duncan's on the three varieties of Consumption.

A most striking instance of the evils of a symptomatical classification of diseases is exhibited in the conjunction, by Dr. Cullen, of Pleurisy and Peripneumony under one name and species (Pneumonia). Many of their symptoms are undoubtedly the same, and it may often not be easy to distinguish the two diseases when existing separately; yet it is evident, no two affections can be really more distinct in their nature than an inflamed pleura with effusion in the chest, and an inflamed lung with thickening of its parenchyma.

Tenacious Sputa in Peripneumony, Page 50.

This character of the sputa is very characteristick: it shows the importance of examining the expectorated matter in all cases of diseased lungs. Indeed a *crachoir* ought to form an invariable part of the furniture of a pulmonary invalid.

The third variety of Peripneumony is confounded by many observers with Phthisis. See Portal, Morgagni, Southey, &c.

Hæmoptysis, or Pulmonary Apoplexy, Page 60.

Mr. Burns I think cursorily notices, and perhaps accounts for, the condition of the lungs named Pulmonary Apoplexy by our author. He considers it as always the consequence of disease of the heart, viz. dilatation of the right side. "The pulmonic vessels by the congestion and continued *vis a tergo* are ruptured; blood is forced into the air cells; Hæmoptysis is produced; or, if urged still further, all the cellular structure of the lungs is crammed with blood; these

organs cut like liver, and sink when put into water. This I am convinced from repeated observations is a frequent cause of hæmorrhage from the lungs, and I have seen several who have lost their lives from not preserving the muscular action within proper limits." Burns on the Heart. p. 53. Mr. Burns's view of the matter is highly important, and, like all pathological facts, tends directly to the improvement of practical medicine. Certainly his idea receives countenance from the general fact (noticed by him) of hæmoptysis being mentioned by almost all writers as a symptom of enlarged heart. It is worthy of notice that the two cases (15 and 16) of Hæmoptysis given by our author are complicated with disease of the heart, but only in one of these was this in the right side. What further enhances the probability of this explanation of the phenomenon, is the fact of occasional rupture of the pulmonary substance in these cases, as mentioned by M. Laennec, page 63.

Pulmonary Catarrh, Page 68.

For a much fuller account of all the varieties of this disease see the excellent Treatise on Bronchitis by Dr. Hastings. See also, the valuable little work of Dr. Badham on the same subject, and the treatise of Dr. Cheyne on the Pathology of the Larynx and Bronchia.

M. Laennec perhaps exhibits this affection in a simpler state than it is often met with in practice, especially in severe cases. Unquestionably the inflammation often extends to the substance of the lungs. Dr. Hastings particularly notices this, page 282; where he states the inflammation of the lungs as frequently reaching the degree of hepatization. This is also noticed in many cases of chronic Bronchitis given by Dr. Hastings. For instance, see Case 1, 2, 5 (particularly), 8, 18, and 22. It is worthy of remark that out of the 19 cases of the acute disease given by the same author, only one or two exhibit the complication of

peripneumony—viz. No. 3, and 19, and these only in a slight degree.

However different Bronchitis and the true tubercular Phthisis are in their nature, it will readily be admitted by every practitioner of experience, that, in certain cases, it is impossible to distinguish them by any or all the usual symptoms. This is acknowledged by almost all writers on the subject of these diseases. Among others, see Armstrong, page 184; Young, page 31; Hastings, page 290. Of the great importance, however, of a distinction between these diseases there can be no doubt, when we consider their very different pathological character; and on this account, the new method of diagnosis of our author is unquestionably of the greatest value to these two diseases.

More than one-half the miners of Cornwall die of varieties of this disease. In them it is very often complicated with disease of the heart; and is to be attributed to a great complication of causes. I hope to lay before the public an account of this affection so dreadfully destructive of human life.

Dilatation of the Bronchia, Page 76.

Perhaps this ought not to be considered as a distinct disease, but rather as an accident or symptom of Bronchitis or some other diseases of the lungs accompanied by cough. I know of no author who has previously noticed this affection, except Störck. See his Biennium Medicum, Leyd. 1761.

Emphysema of the Lungs, Page 81.

This is a new disease, at least in practical medicine. It is only by the progress of pathological knowledge that we can hope for a true nosology. Under the term *Asthma,* as many very different diseases are confounded as under the term *Consumption.* It is hoped that the present work will be of no small use in leading to the discrimination of diseases, which cannot be confounded without the greatest

injury to the subjects of them. Our author, unlike some of his countrymen, does not range all asthmatic affections as consequences of disease of the heart, although he evidently considers the disease as much more frequently symptomatic than idiopathic. If the term is to be retained in medicine, it ought to be restricted to the idiopathic or spasmodic variety; or used as the generic name comprehending the various species symptomatic of Bronchitis, Diseased Heart, Emphysema and Œdema of the Lungs, &c. as well as the nervous or the idiopathic, so well described by Dr. Bree. See his Treatise on Disordered Respiration.

Œdema of the Lungs, Page 97.

This condition of the lungs is noticed by many English authors. Dr. Baillie says he has not seen any well marked example of it. Morb. Anat. page 77. Dr. Parry considers it (Elements, page 106) as a frequent, and indeed necessary consequence of peripneumony, and in this he seems corroborated by the experience of our author, page 98. Dr. Darwin notices it among other dropsies under the title *Anasarca Pulmonum*. See Zoonom. vol. iii. page 172, London, 1801. See also Dr. Perceval's Essays, Med. and Exper. vol. ii. page 177. He says, "The difficulty of respiration is constant, and increased by the least motion, though not much varied by different attitudes of the body; the patient complains of great anxiety about the *precordia*, and when he attempts to take a deep inspiration, he finds it impossible to dilate his chest, and his breath seems to be suddenly stopped." It is obvious that these remarks afford only a very imperfect diagnosis of this disease.

It is somewhat singular that this affection does not seem to occur in those cases of general dropsy which are consequent on Bronchitis. See Dr. Hastings's Treatise, page 352.

Bony Concretions in the Lungs, Page 117.

These generally consist of a large proportion of phosphate of lime, a small proportion of carbonate, and animal matter. See Thomson's Chemistry, 5th edit. vol. iv. page 572. See also Dr. Prout's Analysis, Lond. Med. Repos. vol. xii. page 352.

Black Pulmonary Matter, Page 130.

In the Philosophical Transactions for 1813, Dr. Pearson has given an account of this matter, and a chemical analysis of it, which, as usual, are overlooked by our author. I give the result of Dr. P.'s examination in the words of Dr. Young:—"He [Dr. Pearson] considers the bronchial bodies as true lymphatic glands, and thinks the black substance which often tinges them, consists of charcoal, derived from small particles of dust, floating in the atmosphere, which have been taken in by the absorbents, and deposited in their glands: and he has found some of the lymphatics occasionally filled with a similar substance. He supports his opinion by chemical experiments, which show the insolubility of the black substance in nitric acid, while he has been unable to find any other animal substance, the ink of the cuttle-fish not excepted, that resists the action of the acid. The glands of the mesentery, he says, are also sometimes black, but their blackness disappears upon immersion in the nitric or muriatic acid.*"

Medullary Tumour, Page 137.

It is extremely discreditable to M. Laennec not only to have taken no notice of the English works that mention this species of tumour, but to have claimed the discovery of it to his own country. He may certainly plead the custom of his country in excuse; but he might have had sufficient candour to consider this as a custom more honoured in the breach than the observance. It is scarcely necessary to

* Young on Consumption, page 468.

refer the English reader for an account of this affection to the works of Burns, Hey, and Abernethy, and more especially to the treatise of Mr. Wardrop on *Fungus Hæmatodes*, or Soft Cancer; Edin. 1809. A remarkable case of this disease existing in many organs at the same time, and among others the lungs, is given by Mr. H. Earle in the third vol. of the Med. Chir. Trans. page 59.

Pleurisy, Page 144.

The chapter on Pleurisy offers an admirable specimen of Pathology. It contains much that is novel; and much that must tend to the improvement of practical medicine.

The fact of the inflammation of serous membranes being always accompanied with a serous effusion, although noticed by pathologists for a good many years, since the publications of Carmichael Smyth and Bichat, appears to be still very imperfectly known to the profession in general. The phenomenon has been stated by no writer more distinctly than by Dr. Parry in his late most elaborate work on Pathology. See page 107 et sequent. With the knowledge of this fact before our eyes, it is surprising that the recent doctrines respecting the inflammatory character of many dropsies, did not arise among us sooner. In the cure of acute pleurisy, ought the knowledge of the fact of serous effusion to influence our practice in ordinary circumstances? Of course, the best remedies for checking or preventing it are those which tend directly to reduce the inflammation; but when the inflammation is checked, or while we are endeavouring to check it, will it be well to keep in view the dropsical affection (for it is truly such) which, though a mere consequence of the original disease, is now itself a disease? On this principle ought we to follow up the antiphlogistic treatment with means calculated to promote the action of the absorbents and the kidneys?

Thickening of the Pleura, Page 147.

This is asserted by Dr. Baillie, page 54, although denied

by our author, page 147. I think the very definition of inflammation (redness, *swelling*, &c.) necessarily involves some degree of thickening.

Where so many cases of Acute Pleurisy are on record, and so many must have been met with by every practitioner of experience, it may seem useless to refer to any individual case. Owing to its conciseness, however, and its perfect accordance with what I have myself seen, I must refer to the appearances on dissection in a case detailed in the Lond. Med. Repos. vol. v. page 479.

Cartilaginous thickening of the Pleura is mentioned by Parry. Elements, page 114.

Chronic Pleurisy, Page 156.

No disease has been more misunderstood than this, both in a pathological and practical point of view. For an excellent account of the *external symptoms* of this affection see Dr. Armstrong's treatise on Scarlet Fever, &c. page 193: see also Dr. Abercrombie's paper already referred to in the Edinburgh Journal.

Contraction of the Chest, Page 159.

M. Larrey in a late number of the Journal Compliment. des Sc. Med. for May 1820, details several very interesting cases of Chronic Pleurisy and Empyema, resulting from wound, in some of which this contraction of the chest was very strongly marked. See Medico-Chir. Review for Dec. 1820. It would appear that this condition of parts existed in some of the cases called *Tuberculous Accretions* by Dr. Baron. See page 173-4, &c. of his work.

Empyema, Pages 158 *and* 190.

This operation has often been performed, and with much advantage, in this country. A very interesting case of chronic pleurisy, in which this operation was performed, has been lately published by Dr. Hennen in the 65th No. of the Edin. Journal. It is to be remarked as a most striking instance of the want of precision in our ideas respecting diseases of

the chest, that this learned and experienced gentleman should have denominated this most decided case of Pleurisy —*Hydrothorax*.

In the cases of M. Larrey above referred to, he mentions an œdematous state of the teguments behind the hypochondrium of the affected side as an invariable pathognomonic sign of effusion of blood into the chest. The same condition of the chest is noticed by our countryman Mr. Sharp in the case of Empyema (Crit. Inquiry, § *Empyema*); and also by Mr. Hey (Surgery, page 476.)

Fluctuation in Empyema, Pages 176 *and* 346.

Many English authors mention this symptom. In many of the cases recorded we have not sufficient data to enable us to ascertain the correctness of M. Laennec's idea of the uniform co-existence of pneumo-thorax with empyema in all cases wherein succussion produces the sound of fluctuation. In Mr. Hennen's case this effect was very perceptible, and from some parts of the narrative it would seem probable that there was here an effusion of air also.

Place of Election, Page 190.

In one case, contrary to the usual practice, Mr. Hey operated between the fifth and sixth ribs.

Idiopathic Hydrothorax, Page 192.

The great rarity of the true hydrothorax ought to make us cautious how we give this name to so many affections as we are accustomed to do; and the undoubted fact of a serous effusion being an almost uniform attendant on the inflammation of serous membranes, ought to make us slow to trust to mere diuretics and other similar remedies in cases wherein we have strong reason for suspecting dropsical effusion, especially in the chest. The now very generally allowed connexion between dropsy and inflammation, mentioned by our author in many parts of this treatise, is still much better understood in England than France. It is therefore hardly necessary to refer the English reader to the

works of Blackall and Parry, and especially Crampton, for the practical and pathological illustration of this important doctrine.

Symptomatic Hydrothorax from tubercles on the Pleura, Page 196.

In this and many other parts of the treatise, our author notices the tuberculous affections of serous membranes lately so ably illustrated by Dr. Baron. It must be very satisfactory to that gentleman to have his statements corroborated by so great an authority; more especially as they were evidently unacquainted with each other's inquiries. Dr. Baron's work is a most valuable addition to our pathological knowledge; although the author appears occasionally to have extended his peculiar views to some morbid appearances which might perhaps be explained on the principle of ordinary inflammation.

Hæma-thorax, Page 198.

This is noticed by Dr. Parry, page 119, and sanguineous effusion mentioned as an occasional consequence of inflammation in all textures.

Pneumo-thorax, Page 203.

Dr. Duncan, Jun. informs me that he has often met with this affection in cases of empyema. Where he suspects it before opening the thorax, he examines the diaphragm from the abdomen.—"In one case lately," he says, "as I predicted, we found the diaphragm on one side convex upwards, and on the other convex downwards: on puncturing an intercostal space on *this* side, the air rushed *out* and the diaphragm rose into the chest."

Diseases of the Heart, Page 213.

It is not very creditable to M. Laennec not to have noticed some of the English authors on diseases of the heart, especially Mr. Burns and Dr. Farre, and also Dr. Warren's little work. In the excellent treatise of the former, much

very valuable matter is contained. For many valuable observations respecting the affections of both the lungs and heart, the reader is referred to Mr. Howship's Pract. Obs. on Surg. &c.

Hypertrophia, Page 213.

This is excellently described by Mr. Burns, page 40.

Dilatation of the Heart, Page 215.

Mr. Burns states this condition of the heart to terminate very commonly in chronic inflammation. I fear M. Laennec is occasionally too exclusive in his distinctions.

Dilatation of the heart is considered by Mr. James (Med. Chir. Trans. vol. viii.) as frequently caused by obstruction in the minute secerning and nutrient vessels.

Ossification of the Heart, Page 230.

In addition to the few cases of this mentioned by our author, a remarkable case is noticed by Mr. Burns, page 131, in which there was a broad belt of bone round both ventricles. In another case he found both ventricles "mere calcareous moulds."—It is singular that M. Laennec no where notices the ossification of the coronary arteries, considered by Dr. Parry as the usual cause of *Angina Pectoris*. See Dr. Parry's treatise.

Carditis, Page 232, *and Pericarditis, Page* 263.

These two diseases have been commonly confounded in dissection, and they cannot be separated in practice. For an excellent account of this see Dr. Baillie's Morbid Anat. See, also, the much less satisfactory work of Dr. Davis on Carditis. I have already mentioned Mr. Burns's opinion of this disease frequently supervening to dilatation of the heart.

Globular Excrescence, Page 247.

This is noticed by Mr. Burns, page 194. In a case of Polypus mentioned by Mr. Burns, page 200, he states perfectly formed pus to have been contained in it:—was this an instance of M. Laennec's *Globular Excrescence?*

Red colour of Internal Membrane, Page 249.

Some recent attempts have been again made to connect this appearance with inflammation, and to make a general affection of the arteries of this kind to act an important part in the pathology of febrile diseases,—how truly, I am very sceptical.

Malformation of the heart, Page 255.

For a much more complete view of affections of this nature see the works of Mr. Burns and Dr. Farre.

Hydro-Pericardium, Page 270.

For some curious cases of this affection, in some of which *tapping* was successfully performed by Dr. Romero, a Spanish physician, see Dr. Johnson's Review for Dec. 1820, page 477.

The Pulse, Page 366.

The remarks on the Pulse are extremely important. The insufficiency of this as a test of disease must be acknowledged by every practitioner of experience. Yet it is surprizing to perceive the effect of habit and early associations in this matter. How often do we hear of a pulse being half a dozen or half a score of pulsations above or below par, and indications of cure founded on this important alteration! For some excellent observations on this subject see Dr. Parry's Elements, page 48 and seq. "If these things are so, surely we ought to wonder at the confidence with which physicians look to the condition of the pulse in the radial arteries as the general evidence of the state of disease, and the chief rule of the administration of remedies." Parry, page 50.

The purring sensation mentioned by M. Corvisart and our author, page 379, is attributed by Dr. Ferriar to simple dilatation of the heart; and by Mr. Burns to *Hypertrophia*, or to dilatation with chronic inflammation, or with lessened size of the arteries.

In employing the cylinder in diseases of the heart, there is one source of error which I think it the more necessary to point out, as I was myself more than once misled by it in my earlier exploration. When the instrument has been closely applied for some time the skin occasionally adheres in some degree to it; and when the motion of the patient's body, or a deep expiration, detaches it, in the moment of separation a sound somewhat resembling that produced by the tearing of cloth, or by a rasp upon wood, is excited; and may, without attention, pass for the sound said to characterise contraction of the valvular orifices.

EXPLANATION OF THE PLATES.

PLATE I.

FIG. 1. This represents a section of the superior lobe of the lung, containing tubercles in different stages, and a vast tuberculous excavation. There are also, here and there, some pulmonary spots, more numerous between the excavation and top of the lung.

a. Very large anfractuous excavation, produced by the softening of the tuberculous matter, which still lines it partially.

bb. Columnar bands crossing from one side of the excavation to the other, composed of the pulmonary tissue condensed, and covered with a thin layer of tuberculous matter.

cc. Masses formed by the reunion of several immature tubercles, exhibiting, in the section of their substance, an indented appearance. The shaded parts represent the grey and semitransparent matter of the incipient tubercle, and the inner white portions point out the same where it has become yellow and opaque.

d. The miliary granulations of M. Bayle.

ee. Bronchial tubes opening into the excavation.

f. Part of the exterior surface of the lungs.

Fig. 2. A section of the upper lobe of the left lung, exhibiting a vast and very antient pulmonary fistula, traversed by obliterated blood vessels, and lined by a thin semi-cartilaginous membrane. Between this cavity and the top of the lung are seen spots of black pulmonary matter, tinging the substance of the lung quite black.

a. Bottom of the fistula lined by the semi-cartilaginous membrane.

bbb. Bronchial tubes opening into it.

ccc. Obliterated blood vessels, crossing the cavity and then ramifying on its walls.

d. Small excavations, or ulcerations, occupying only a portion of the thickness of the semi-cartilaginous membrane.

ee. External surface of the lung.

PLATE II.

Fig 1. Section of the upper lobe, the exterior of which is seen in Plate V. fig. 2.

a. Fibro-cartilaginous cicatrix surrounded by pulmonary substance strongly marked by the black matter, yet in other respects sound and crepitous.

b. A bronchial tube greatly dilated and terminating in a cul-de-sac at the cicatrix.

c. The same obliterated and continued into the cicatrice. (Some other bronchial tubes seen open on the surface of the section, point out the original diameter of the dilated branch.)

d. Bands of accidental serous tissue uniting the lungs to the pleura of the ribs.

Fig. 2. Incomplete cicatrization of a tuberculous excavation.

a. Group of incipient tubercles, grey and semi-transparent externally, yellow and opaque in the centre. These and the whole lung are interspersed with spots of the black pulmonary matter.

b. Cartilaginous cicatrice, almost linear.

c. Extremity of this, divided into two layers and enclosing a small portion of dry tuberculous matter.

d. Blood vessels cut across.

e. Immature tubercles.

f. Exterior surface of the lung.

PLATE III.

Fig. 1. Deep depression on the surface of the lungs corresponding to a cicatrice within.

a. Portion of the upper lobe.

b. Depression corresponding with the cicatrice.

c. Part of the anterior border of the lung overlapping the depressed portion.

d. Part of the posterior border of the lung.

Fig. 2. Cartilaginous fistula, with very unequal walls, in the upper lobe of the lung.

a. Surface of the lung.

b.

c. d. The cartilaginous mass.

ee. Part of the pulmonary substance comprised between the cicatrice and summit of the lung, quite black with the black pulmonary matter.

f. Fistulous excavation in the centre of the mass, with two bronchial tubes opening into it.

PLATE IV.

Fig. 1. Part of the upper lobe exhibiting several of the air-cells immensely dilated.

aa. Surface of the lung.

bbb. Large transparent vesicles full of air, formed by the reunion of several air-cells.

cc. Air-cells in a lesser degree of dilatation.

Fig. 2. Part of the upper lobe also emphysematous.

aaa. Air-cells dilated and prominent.

b. A point covered with dilated vesicles corresponding to a rupture of the substance of the lungs within.

c. Air-cell much dilated and apparently pediculated.

d. Extravasated air between the pleura and lungs.

Fig. 3. Summit of an upper lobe in the state of emphysema, tied to prevent the escape of the air, and dried in the sun, with a slice removed to show the dilatation of the cells.

a. Surface of the Lung.

b. c. Slice removed to show the cells.

Fig. 4. Portion of a sound lung tied and dried as fig. 3, with the view of comparing it with the emphysematous lung.

PLATE V.

Fig. 1. This figure represents different forms of the tuberculous matter, and some of its effects.

aaa. Immature or crude tubercles quite yellow.

b. Groups of incipient tubercles, still grey and semi-transparent externally.

c. Small cartilaginous cyst, emptied of its tuberculous contents.

d. Tuberculous excavation entirely empty and lined by two membranes, the exterior semicartilaginous, the interior soft: a bronchial tube opens into this excavation.

e. Small empty tuberculous excavation, not lined by any membrane.

f. Surface of the lung.

g. Tubercle partly softened and evacuated.

h. Incipient tuberculous infiltration of the pulmonary tissue.

Fig. 2. Depression on the surface of the lung, indicative of an interior cicatrice.

a. The depression.

b. Accidental serous tissue uniting the lungs to the costal pleura. N. B. A section of this figure is given in Plate II. fig. 1.

PLATE VI.

This figure exhibits the effects of contraction of the chest consequent on pleurisy.

a. The sound side.

b. The contracted side.

PLATE VII.

A back view of the same subject.

PLATE VIII.

Fig 1. The Stethoscope or Cylinder, reduced to one third its actual dimensions.

a. The Stopper.

b. The lower end.

c. The upper half.

d. The auricular or upper extremity.

Fig. 2. Longitudinal section of the same.

a. The stopper.

b. Point of union of the two parts.

c. The upper half.

Fig. 3. The same section, with the stopper removed.

Fig. 4. The stopper.

a. The body of it, formed of the same wood as the rest of the instrument.

b. Small brass tube traversing the stopper, for fixing it in the tube of the stethoscope.

Fig. 5. Upper half of the stethoscope.

a. Body of it.

b. Screw (in the wood) for fixing the two portions together.

Fig 6. Actual diameter of the stethoscope.

a. Diameter of the canal of the stethoscope.

N. B. Any turner will be able to make the instrument, from the above description.—*Trans.*

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PLATE I.

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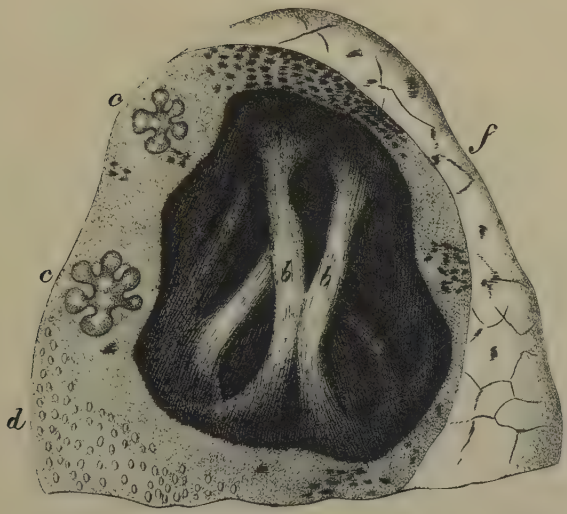

Fig. 2.

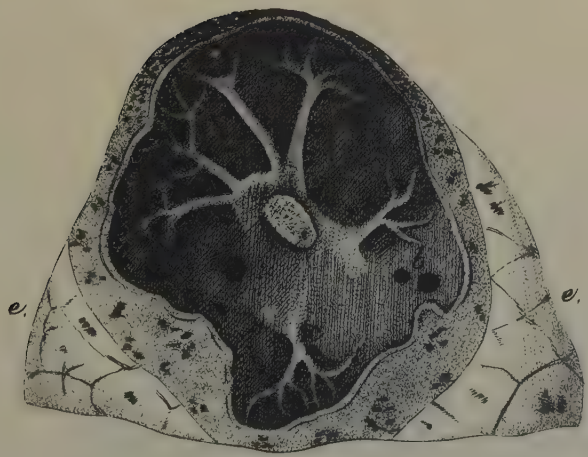

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Fig. 1.

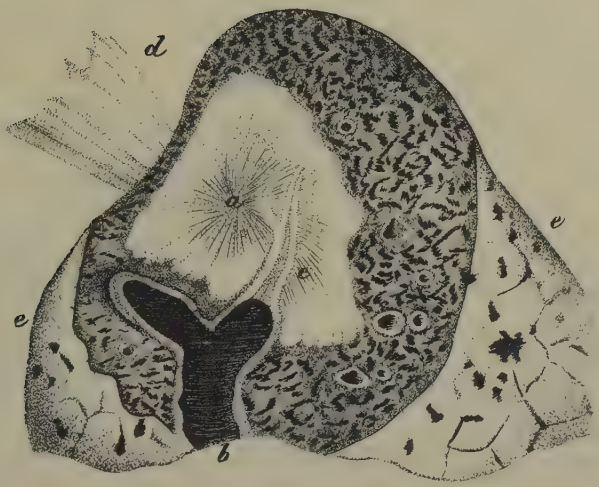

Fig. 2.

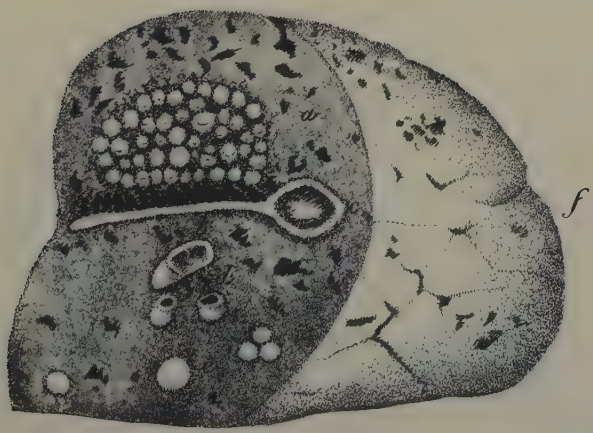

PLATE III.

Fig. 1.

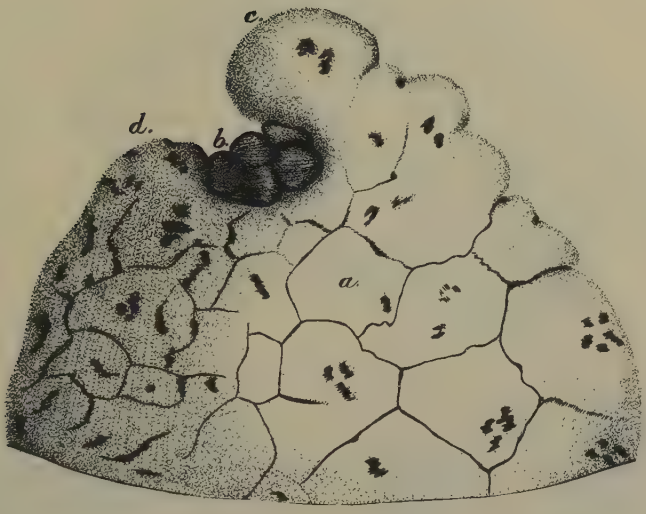

Fig. 2.

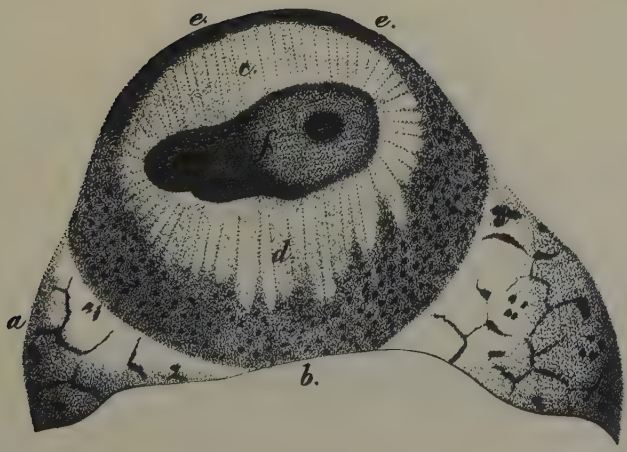

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PLATE V.

Fig. 1.

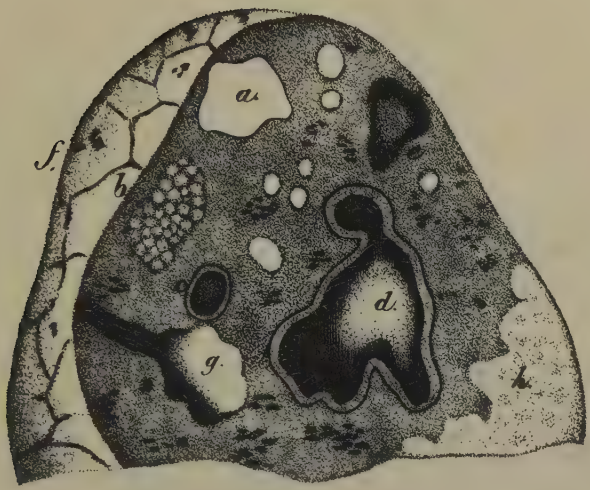
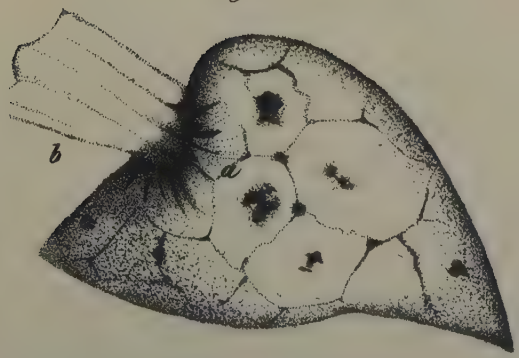


Fig. 2.



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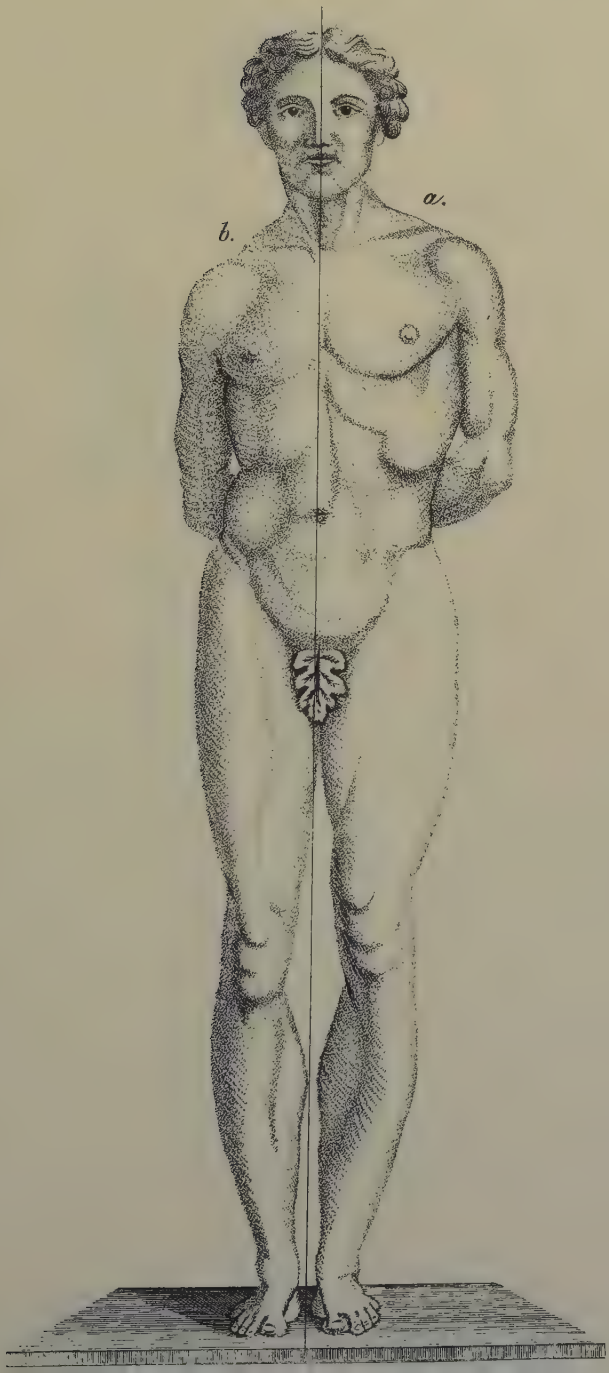

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PLATE VII.

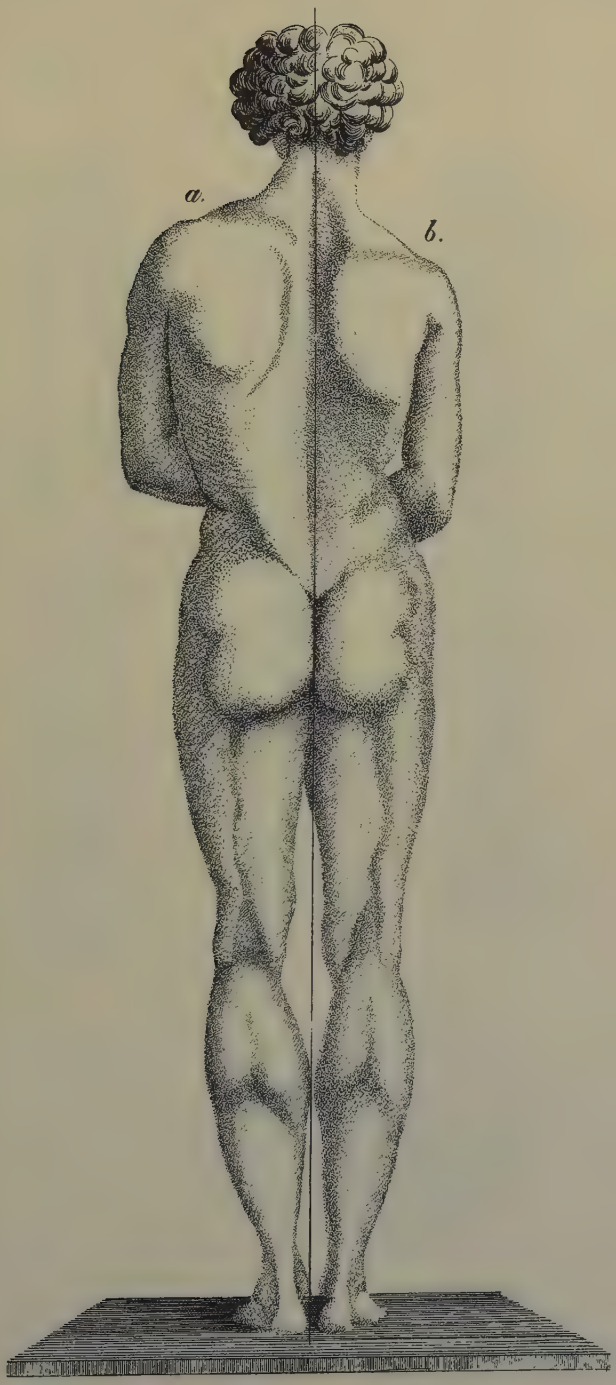

Fig. 1.

Fig. 2.

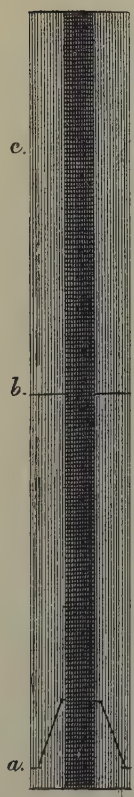

Fig. 3.

Fig. 4.

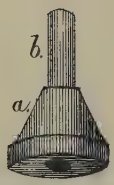

Fig. 5.

Fig. 6.

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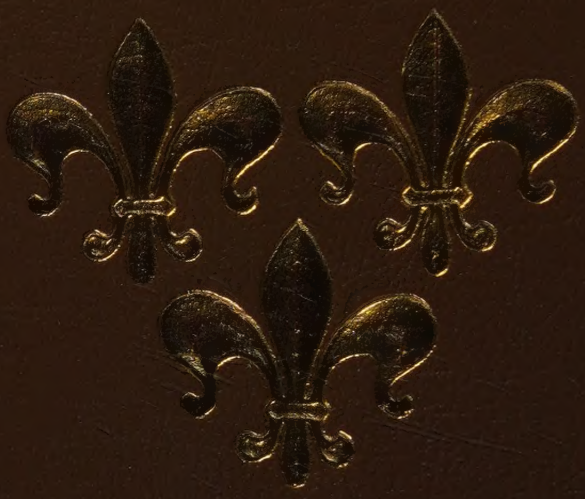
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